Vol. [illegible] In 2 P[illegible] —Part One No. 4

CHEMICAL INDUSTRIES

The Chemical Business Magazine

Why the White Horse

IN A WESTVACO ADVERTISEMENT?

Mounted guards, police dogs and other essentials of effective protection at Westvaco plants are visual evidence of the importance of Westvaco production to the war effort.

So if, on occasion, we still have to turn down or scale down an order for certain Westvaco chemicals without a detailed explanation, you'll understand that your share is destined for military use.

Meanwhile among Westvaco Chemicals on which we presently can make prompt delivery, we solicit inquiries on

Caustic Soda	**Carbon Tetrachloride**
Caustic Potash	**Barium Peroxide***
Sulfur Chloride	**Barium Hydrate***
Epsom Salt	**Barium Nitrate***
Magnesol (TM Reg. U. S. Pat. Off.)	*Produced by Barium Products, Ltd.

Westvaco CHEMICALS

WESTVACO CHLORINE PRODUCTS CORPORATION

405 LEXINGTON AVENUE • NEW YORK, N. Y.

Offices: New York • Chicago • Greenville, S. C. • Newark, Calif.

The Business Magazine for Makers & Users of Chemicals

Management, Research, Production, Marketing

CHEMICAL INDUSTRIES

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THE READER WRITES

"More Harm Than Good"

These are my conclusions on the main features of the Kilgore Bill:

Research is not suited to control by a single Czar even if a suitable man could be found for the position. Increased and more efficient coordination of the research effort and facilities of the country is steadily being achieved through existing organizations. The Office of Scientific Research and Development and the Office of Production Research and Development cover considerable portions of the research field. Very properly they do not cover the entire field. The great industrial research groups of the country are more active than ever before. There is more cooperation between individual groups. This is constantly increasing. More university research groups are becoming engaged in the war effort both through various coordinating agencies and without them. I firmly believe that as closer coordination is necessary, it will be achieved through the research groups themselves. Any attempt to force such closer coordination from the top would do more harm than good.

Any attempt at a super research organization would be practically certain to cripple seriously many research groups which are now functioning very effectively. Any which are not functioning so effectively are probably failing for some reason other than lack of coordination.

The biggest problem in research is the matter of personnel. Many Government research projects are suffering either because men have been taken away from them by direct or indirect action of the Selective Service System or are upset and distracted from their work because of uncertainty as to their being able to stay with their research work.

F. C. Whitmore, Dean,
School of Chemistry and Physics,
Pennsylvania State College,
State College, Pa.

More on the Kilgore Bill

As the executive head of a commercial research organization engaged largely on problems relating to the war effort I want to express a thorough disapproval of the 1943 Kilgore bill for the following reasons:

1. The efforts of our technical manpower are now mobilized in the war effort to a major extent.

2. The disorganization of such efforts which would result from realignments would greatly delay development of results, cause many programs to be dropped or at the best greatly handicap them.

3. You must know from experience, as I do from work with W.P.B. and O.P.R.D. that the details necessitated by government administration hamper progress and initiative. This is not a criticism of methods of governmental administration but a frank statement of the defect as compared with individual initiative. When I expressed to a friend in Government service that due to the necessary detail of such service they were able to do a full half day's work in every nine hours he disagreed with me saying that the estimate of amount accomplished was much too large.

Why not let well enough alone since it would not be improved by the proposed mechanism.

Foster Dee Snell,
Consulting Chemist,
Brooklyn, N. Y.

Opposes Patent Changes

A copy of the following has been received by Chemical Industries from Oliver B. Kaiser of Cincinnati, Ohio:

National Patent Planning Commission,
Washington, D. C.

Gentlemen:

I have given thought to the suggested changes in our patent system as published in the article by R. B. Fiske in the January 1943 issue of Chemical Industries, in which it is indicated that the Commission solicits suggestions.

I have enjoyed over fifty years of continuous service in connection with patents.

It would be unfortunate if an opposition procedure patterned after any foreign practice were adopted, such as one providing "that before patents are issued, claims be published and the public afforded an opportunity to present evidence of prior art which would afford good cause for refusing the patent." This is exceedingly unfair to inventors without financial aid, and leads to expensive procedure in the Patent Office, benefiting only those practicing before the Patent Office.

The question of validity should be determined solely by the Patent Office and appeal tribunals now in existence, after issuance of a patent, and after the owner of a patent has charged an opposer with infringement. "Patent lawyers would no longer comb the country for a court of particular sympathies or prejudices, nor could they start harassing litigation in several Districts."

There would be no necessity for the establishment of a court of patent appeals, as we now have such facilities in the Board of Appeals and Court of Customs and Patent Appeals. Patent owners would have to use caution in charging one with infringement, and the Patent Office would have "the benefit of painstaking searches made by specialists in their fields over many years, more comprehensive than any studies which its own 'alleged' over-burdened Examiners could possibly make." The over-burden of the Examiners could be eliminated if they, instead of acting as opposing counsel, would assist in phrasing allowable claims when the improvement contained novelty over the prior art.

Dating of patent right from the date of filing the application should be adopted, although there would be no need to extend the term to 20 years if the Examiner afforded a little more aid when an improvement presented patentable novelty. Very few devices find marketable value at the end of the present term of 17 years.

There should be no Taxation Maintenance of Patents. The government now receives a tax from profits made.

Yours truly,

Oliver B. Kaiser.

CALENDAR OF EVENTS

Week of Apr. 19, The American Ceramic Society, 45th Annual Meeting, War Congress, William Penn Hotel, Pittsburgh, Penna.

Apr. 20-23, National Electrical Manufacturers Assoc., Spring Meeting, Palmer House, Chicago, Ill.

Apr. 26, Assn. of Consulting Chemists & Chemical Engineers, Inc., Discussion of Kilgore Bill, The Chemists' Club, New York, N. Y.

Apr. 26-27, National Academy of Sciences, Business Session (members only), Washington, D. C.

Apr. 26-28, The American Society of Mechanical Engineers, Spring Meeting, Hotel Blackhawk, Davenport, Iowa.

Apr. 27-29, American Wood Preservers' Assoc., 39th Annual Meeting, Cincinnati, O.

Apr. 28, American Gas Assoc., Natural Gas Management Conference, Gibson Hotel, Cincinnati, O.

Apr. 28-30, American Inst. of Electrical Engineers, South West Dist., Technical Meeting, Kansas City, Mo.

Apr. 30, Chicago Rubber Group, Spring Meeting, Morrison Hotel, Chicago, Ill.

May ? Scientific Apparatus Makers Assoc., Annual Meeting, Philadelphia, Penna.

May 2, The American Chemical Society, New York Section.

May 2-4, American Drug Manufacturers Assoc., Annual Convention, Palmer House, Chicago, Ill.

May 7, American Chemical Society, New York Section.

May 10-11, American Inst. of Chemical Engineers, 35th Semi-Annual Meeting, Waldorf-Astoria Hotel, New York, N. Y.

May 10-14, National Fire Protection Assoc., Palmer House, Chicago, Ill.

May 12-14, American Oil Chemists' Society, 34th Annual Meeting, Roosevelt Hotel, New Orleans, La.

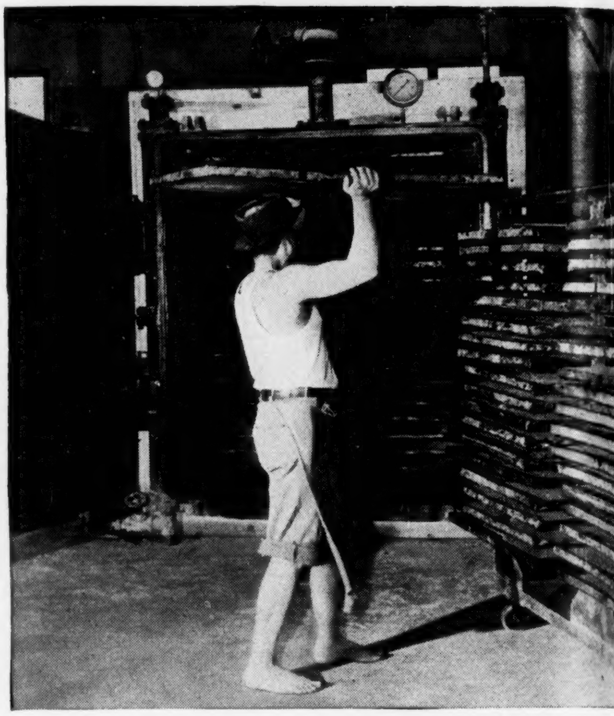
May 17-19, American Assoc. of Cereal Chemists, 29th Annual Meeting, Hotel Jefferson, St. Louis, Mo.

May 20-21, Tanners' Council of America, Conference on War Problems, Waldorf-Astoria, New York, N. Y.

May 31-June 1, Canadian Chemical Association, 26th Annual Meeting and Technical Sessions, Montreal, Canada.

LIFE ON THE

TO MEET AMERICA'S RUBBER NEEDS, synthetic production is being aided by natural rubber grown in this hemisphere—such as that produced from Guayule, a shrub which thrives south of the Rio Grande and contains a greater percentage of rubber by dry weight than any other known plant other than the rubber tree. Rubber extracted from this shrub is dried in trays (top right) and then pressed into slabs weighing about 100 pounds (lower right) for shipment to refineries. Plans are being made to erect modern extraction mills which wil speed production by replacing present old-fashioned methods PARRAS washed and dried Guayule is now being offered to industry by American Cyanamid, through the Rubber Reserve Company.



(Above) **MORE APPLES** this year, thanks to Naphthalene Acetic Acid, produced commercially by American Cyanamid. This chemical makes stems adhere longer to twigs, decreasing the damage caused when fruit prematurely falls. Such growth-controlling chemicals may also protect our domestic tung oil supply, one of our serious industrial shortages, by delaying the opening of buds on tung trees past frost-danger time.

WASHINGTON

By T. N. Sandifer

New WPB Set-up Questioned by Industry

THE latest War Production Board shake-up is merely another move in a series resulting from the more violent split of several weeks ago, when Chairman Donald Nelson displaced Vice-Chairman Ferdinand Eberstadt and began reshaping the organization. It is the opinion of closely-informed observers from industry here that a further revamping of WPB is almost inevitable.

The latest changes caused considerable dissatisfaction, both within the WPB organization and among industrial bystanders who knew what was happening. Of particular concern to members of the chemical industry is the fact that Dr. E. W. Reid in all probability will leave Washington, where he has been an able representative of the broad chemical interests of the country in the war effort. Coming to Washington early in the war, his executive abilities resulted in varied service, including director of the Commodities Bureau and other posts in the Chemical Division, finally as chief of the division, then as Deputy Director for Industry Divisions for the whole WPB.

T.N. Sandifer

While he was himself non-committal, it is understood that he was opposed to the latest reorganization order, believing with others that the new horizontal set-up would not work as well as a vertical organization—the same old difficulty, he believed, of lack of sufficient authority on the part of the various officers to whom other officials would be reporting.

However this may be, Dr. Reid declined any further assignment, for the time being at least. Donald D. Davis, as Operations Vice-Chairman, a new title, will have supervision, among other industry activities, of the Chemicals Division, Containers Division, Pulp & Paper Division, and other groups, such as those handling cork, asbestos, minerals, pulp and paper. Mr. Davis will report to Executive Vice-Chairman Charles E. Wilson, as will also Vice-Chairman Ralph J. Cordiner who among other things will have under his jurisdiction the Office of Production Research and Development,, of which Dr. Harvey N. Davis is director.

Chemicals Division Intact

The Chemicals Division itself is left intact except for incidental changes. Among the more important of these was the resignation April 1 of E. H. Bucy as chief of the Protective Coatings section, who has indicated a desire to get back into private industry. He will be succeeded by Thomas J. Craig, who has been associated with the branch since November, 1941, and has been assistant chief since January this year. He came to Washington from du Pont's Krebs Pigment Division.

A considerable amount of quakishness can be detected in the whole WPB establishment. The Office of Civilian Supply is under suspicion in some quarters, including Congress, of promoting the substitution of government grade markings for established brand labeling on various goods. While this charge is denied in that office and others likewise under suspicion, the fact remains that OCS may be shaken up before long. Vice-Chairman Wilson, immediately under Chairman Nelson in WPB, is reportedly only waiting until he can induce some national business executive to take over the Office of Civilian Supply to replace the present head, Joseph L. Weiner.

The fate of WPB's planning committee is still in the balance. Some resignations are being held on the desk for the moment. This is also the case in the Office of Price Administration. All of these agencies have their effect on the chemical field and any changes at the top necessarily presage policy changes.

Occupational Deferments

One other matter of broad interest to the industry is an intimation, not yet officially phrased, that Selective Service will abolish the present 3-B rating in draft deferments in favor of outright occupational deferments where these are justifiable, others, because of dependency, being reclassified as 3-A, which still means they would be in the end-row of induction potentials.

One of the more general complaints about WPB and OPA orders is that too many of them are still written by people who do not know the workings of the industry they affect. Thus, M-221 (Paper Bags) was unsatisfactory to many chemical users in its initial form. It is undergoing revision which is expected to exclude chemicals from its scope. It is pointed out by industry representatives that had it been drafted originally by more practical hands this would have been unnecessary. This has led to a suggestion for a Chemical Shippers' Industry Advisory Committee, which would give users a voice in such matters. To date this is only in the idea stage at WPB, but may lead to an organization later.

Inventory Control

There is a disposition in WPB now however, to correct at least one of the sources of trouble in the industry, that of maintenance of inventories. Representations have been made from time to time that month-by-month restrictions of inventory work hardships in many instances. While no formal amendments have been announced, the Chemicals Division has shown a disposition to regulate allocations in certain cases, with the fact in view that transportation difficulties now add up to 40 per cent more time on shipments of materials. Inventory control, particularly where it impinges on the forthcoming general operation of the Controlled Materials Plan, beginning July 1, is attracting more and more attention at WPB. Materials under this plan are in a limited category, and only affect the chemical field where they are directly involved.

Illustrating the effect of government activity on private industry, various price control and other limitations are about to interfere seriously with alcohol production, though such was not the intention of Washington authorities. Nevertheless, as many as 100 industrial alcohol plants may be forced to shut down because they depend on corn supplies as a basic raw material and the supply is artificially short. The question became acute when supplies for the second quarter came before industry meetings here.

THE FLOW *of Progress*

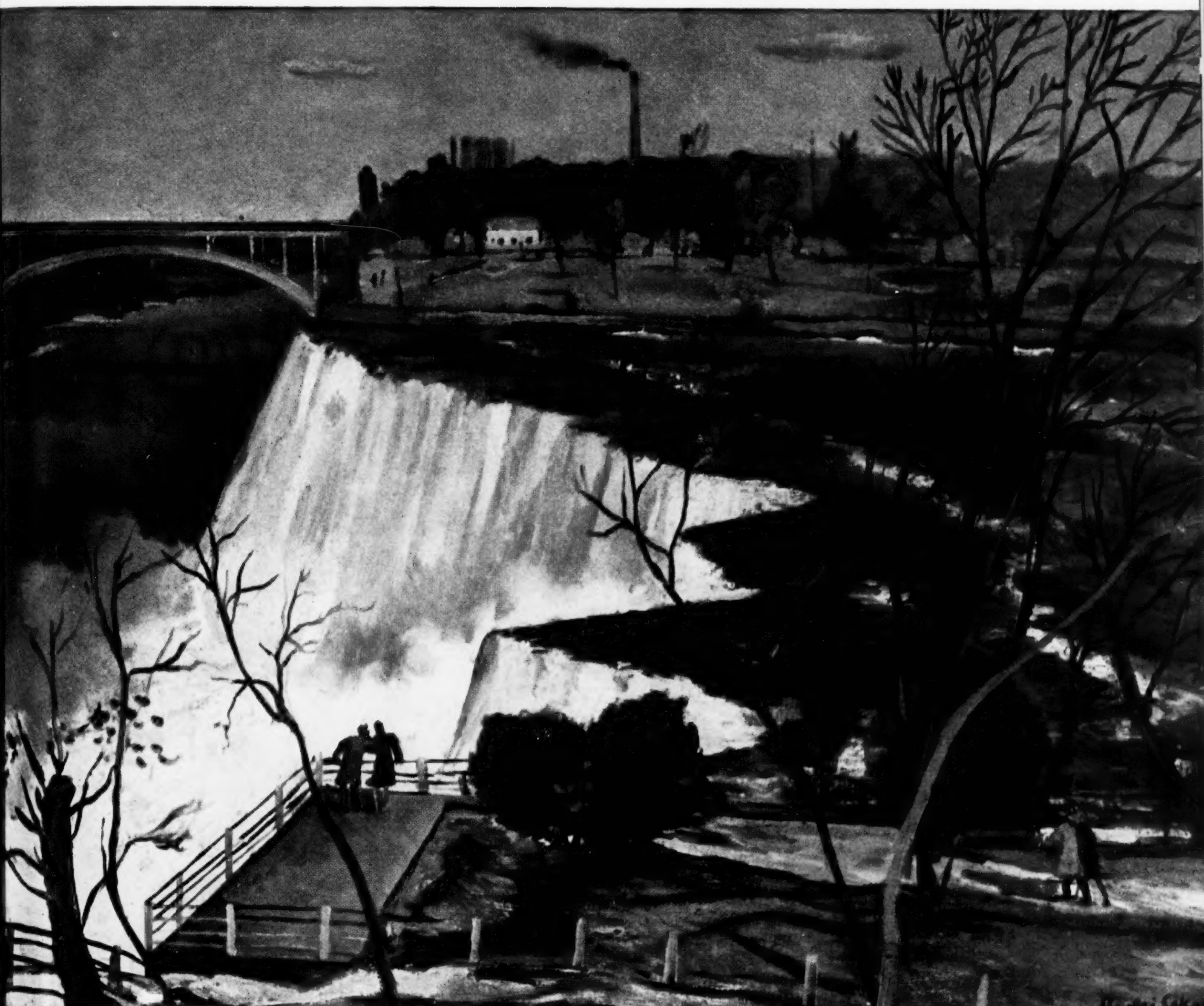
The spirit of America herself is expressed in the flowing power and free forward movement of Niagara. Perhaps that is why the Falls have become a symbol of this country's inner nature as well as an expression of her rugged outer appearance.

In no other age and country has the flow of progress been so swift and continuous. Progressive change is inherent in the American character. We are quick to accept the new but careful to guide it into the channels in which our habits and customs run. In the world today, this adaptability is proving to be one of our greatest assets. In a matter of months we are accomplishing that which has taken other countries years to achieve. If we can do this, surely adaptation to the new world which will emerge from the war should not be difficult. For we are already being prepared for it by the changes that war itself has brought. Here is one of the reasons why America is destined to leadership in the years to come.

We who work within sight and sound of Niagara Falls are devoting every ounce of our energies and facilities to speeding the flow of chemicals for Victory.

CAUSTIC POTASH • CAUSTIC SODA
PARA • CARBONATE OF POTASH
LIQUID CHLORINE

FROM THE ORIGINAL BY NICOLAI CIKOVSKY . . . IN NIAGARA ALKALI COMPANY'S COLLECTION OF PAINTINGS OF NIAGARA FALLS



NIAGARA ALKALI COMPANY
EBG
60 EAST 42nd STREET, NEW YORK, N. Y.

An Essential Part Of America's Great Chemical Enterprise

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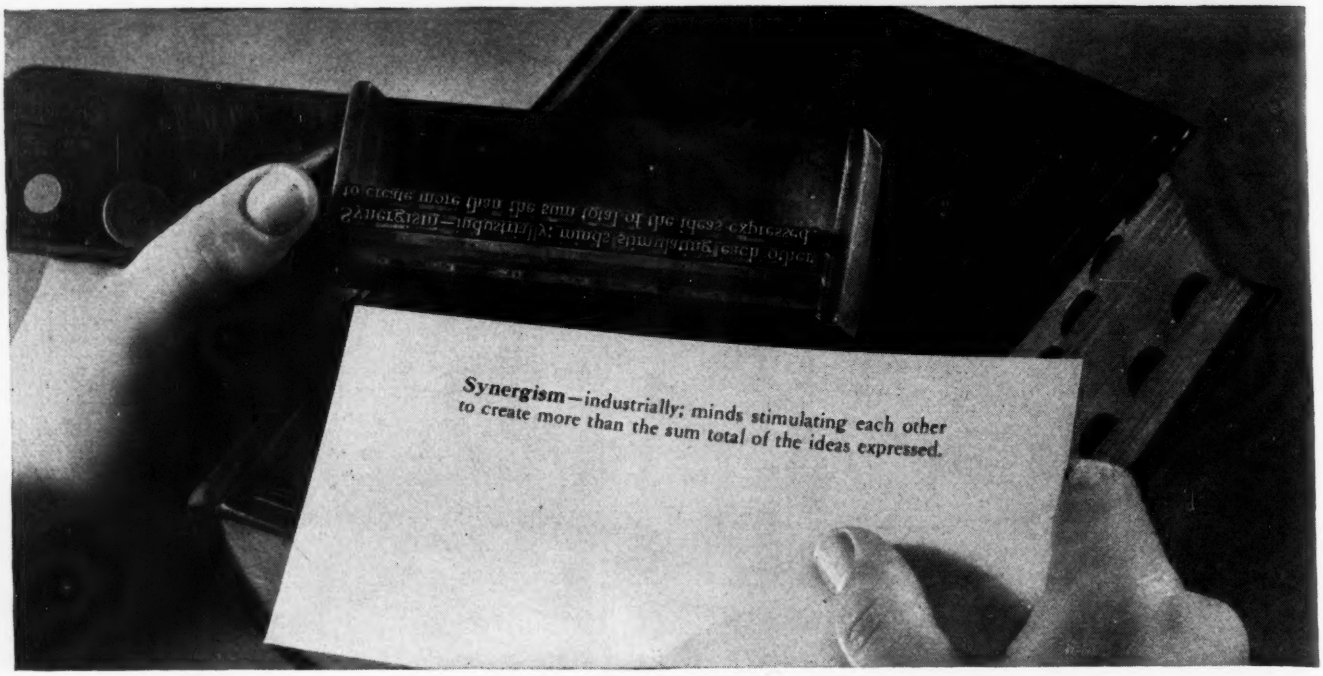
A New Definition



for the Industrial Dictionary

New ideas create new products, new methods, new words to describe them. And out of this war a word is emerging with a new meaning for future industrial progress—"Synergism."

War production has brought gigantic strides in industrial cooperation. Men have banded together to cooperate with a will-to-accomplish in a degree far greater than ever the world has known.

As minds meet to cooperate with the single purpose of accomplishment, they stimulate each other to create more than the sum total of the ideas expressed—"click to give a plus value" might be the slang for it. This is "Synergism."

Synergism is not a new word. It's an old word, with classic Greek roots meaning "working together." It long has had its meaning in chemistry, in medicine, in theology. Basically, it has always meant forces working together to develop a whole greater than the sum of the parts.

And war accomplishment has re-introduced "Synergism" with a significant meaning for Industry. It provides a name for the factor that keeps working miracles in industrial progress.

We at Atlas have been practicing synergism in our spheres of chemical production to accomplish some outstanding results in collaboration with other companies. We think our minds will "click" with yours. Let us try the experiment.

Industrial Chemicals Department

ATLAS POWDER COMPANY

WILMINGTON, DELAWARE

Offices in Principal Cities

Industrial Explosives • Industrial Finishes • Coated Fabrics • Acids
Activated Carbons • Industrial Chemicals • Ordnance Materiel

Can you use this new pigment?

HYDRATED CALCIUM SILICATE

Silene*

Blood Plasma Saves Lives—
Have You Contributed?

*Another Columbia Chemical

WHAT SILENE IS: SILENE is a new chemical pigment—a white, finely divided, precipitated, hydrated calcium silicate, with the following approximate analysis:

CaO	19.0
SiO_2	67.0
Loss on Ignition	14.0

pH in water suspension	10.1
Specific Gravity	2.10
Bulk Density	15 to 16 lb. per cu. ft.
Refractive Index	1.475

CHARACTERISTICS OF SILENE: SILENE is composed of very fine particles present in the form of small, highly friable agglomerates that are readily dispersed in the course of milling into rubber, paint, or vehicles. SILENE also can be redispersed in water.

PRESENT USES: SILENE has had rapid acceptance as a rubber pigment with outstanding results. It confers high modulus, hardness, tear resistance, and good tensile strength up to high loadings. SILENE has also found specialized use in the paint, and paper fields.

OTHER USES: Indications are that SILENE will make an important contribution in compounding a number of new rubber substitutes. Favorable preliminary tests of SILENE are being checked on a more extensive scale for use in protective coatings, plastics, cosmetics, dentifrices, ceramics, cloth coating, as a base for printing inks and color lakes, and as a filter aid.

Perhaps you can use this new Columbia product—SILENE—in your operations. Samples of SILENE will be furnished upon request, or one of our Technical Service representatives will call.

COLUMBIA Essential Industrial CHEMICALS

SODA ASH · CAUSTIC SODA · LIQUID CHLORINE · SODIUM BICARBONATE · SILENE* · CALCIUM CHLORIDE
SODA BRIQUETTES · MODIFIED SODAS · CAUSTIC ASH · PHOSFLAKE · CALCENE** · CALCIUM HYPOCHLORITE

*Hydrated Calcium Silicate **Precipitated Calcium Carbonate

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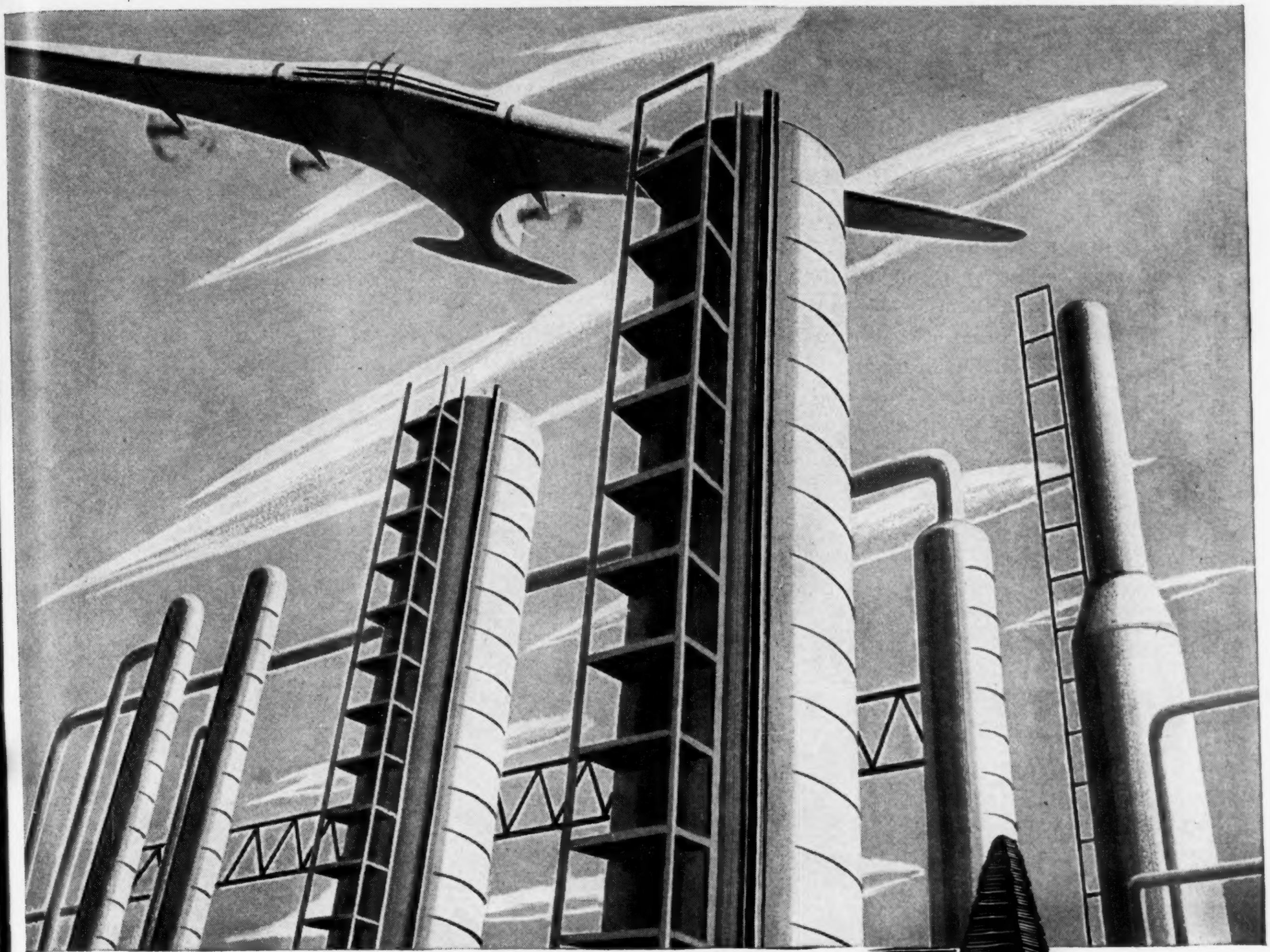
R.C. Hitchcock



Looking

for New Ideas *in plasticizers?*

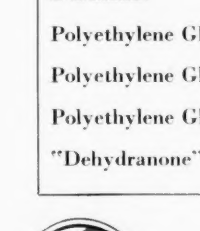
• Among the synthetic organic chemicals developed recently by Carbide and Carbon Chemicals Corporation are several with interesting possibilities as plasticizer intermediates:

Two Six-Carbon Alcohols — 2-Ethylbutanol and n-Hexanol are water-white, medium-boiling alcohols. By reaction with suitable acids, anhydrides, or acid chlorides, they form ester plasticizers having low volatility and water solubility. These alcohols can be supplied now in less-than-carload quantities.

High-Molecular-Weight Glycols—Polyethylene Glycols 200, 300, and 400 are mixtures of higher glycols . . . viscous, light-colored, hygroscopic, water-soluble liquids. They are used as plasticizers for casein, gelatin, zein, glues, polyvinyl alcohol, and special printing inks, because of their low vapor pressures and moderate hygroscopicities. They can be esterified with dibasic acids to form unusual alkyd-type plasticizing resins. These glycols are available in less-than-carload quantities.

Unusual Solid Plasticizer — "Dehydranone" (Dehydracetic Acid) is a white, camphor-like, water-insoluble solid, which is compatible with nitrocellulose, polystyrene, methacrylate and Vinylite resins. At present, this new synthetic organic chemical can be supplied in research quantities only.

Chemical	Formula	Molecular Weight	Boiling Point °C. at 760 mm.	Vapor Pressure in mm. Hg. at 20°C.
2-Ethylbutanol	$(C_2H_5)_2CHCH_2OH$	102.17	148.9	1.1
n-Hexanol	$CH_3(CH_2)_4CH_2OH$	102.17	157.2	0.98
Polyethylene Glycol 200	$HO(CH_2CH_2O)_xH$	200 avg.	—	<0.01
Polyethylene Glycol 300	$HO(CH_2CH_2O)_xH$	300 avg.	—	<0.01
Polyethylene Glycol 400	$HO(CH_2CH_2O)_xH$	400 avg.	—	<0.01
"Dehydranone"	$CH_3COCHCOCH{:}\,C(CH_3)OCO$	168.06	Melts 108	<0.1



For information concerning the use of these chemicals, address:

Carbide and Carbon Chemicals Corporation

Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street **New York, N. Y.**

PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

"Vinylite" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

An urgent message to YOU . . . from U.S.

This attractive 2-color poster, size 14" x 11", will be sent to you free upon request. Write for the quantity you need.

Returnable containers
MUST work *faster*...MUST last *longer*

Today industry is using an increasing number and quantity of chemicals. But production of returnable containers has been curtailed by governmental order. To continue your production you must have chemicals. We can supply them, but we must have containers to get them to your plant.

Help *us* help *you*. For your sake . . . and for victory's sake, take care of the containers you use. And get them back home *on the double quick.*

As a reminder to those in your plant who are responsible for returning containers, we are offering free posters illustrated above. Write for the quantity you can use. Then tack them up on your shipping dock, and wherever containers are kept.

HANDLE 'EM CAREFULLY

EMPTY 'EM PROMPTLY

RETURN 'EM QUICKLY

HARSHAW

THE HARSHAW CHEMICAL CO.

1945 E. 97th Street **Cleveland, Ohio**

Published by Du Pont Electrochemicals Department

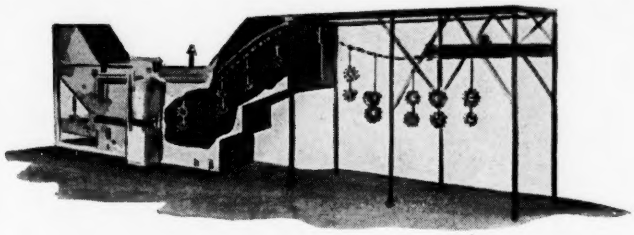
NEWSLETTER

Current Developments of Interest to Users of Chemicals

HARDLY a machine that moves, on land, on sea, or in the air . . . barely an item of manufacture . . . but that a chemical product, a process or service has helped to place it there, or aided in its being.

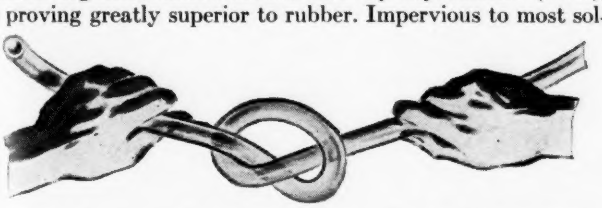
These times of war, du Pont discoveries, developments, assume an import greater than just mere convenience, larger than an added comfort factor, more vital even than the seemingly strong demands of peacetime necessity. These du Pont contributions, once for "better living," now ARE the tools for victory. Review a few that make the news:

"DRY CLEANING" AIRPLANE MOTORS. "Air-cooled" or "liquid-cooled." A fighter plane that pulls, or pushes through the air? There is no difference of opinion when it comes to choice of a degreasing fluid . . . all agree that *Du Pont Chlorinated Solvents*



do a perfect job on airplane motors. Virtually every machined part of these complex engines is degreased at least once during manufacture and inspection. The oil and dirt are simply removed from deep recesses, corners and pockets by the action of hot solvent vapor in the degreasers. This ideal waterless cleaning speeds up manufacture, fits in with modern production lines.

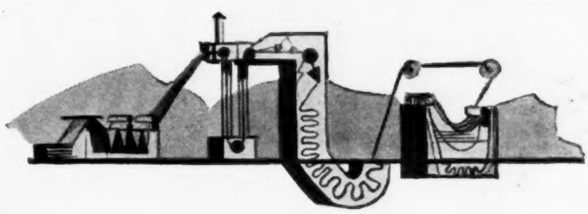
OIL- AND GASOLINE-RESISTANT TUBING. For airplanes, trucks and other military equipment, hose and tubing for fuel and lubricating lines, made from du Pont Polyvinyl Alcohol (PVA), is proving greatly superior to rubber. Impervious to most sol-



vents and gases, the tubing is unaffected by fuels, oils and other organic solvents. It will withstand aging, oxidation, vibration, torsion, flexing, and other stresses. Light in weight, with amazingly high tensile strength, the tubing can be used where flexible lubrication or fuel lines are required. It is available in transparent tubing and also with a tough abrasion-resistant synthetic cover. Other military and industrial products made from PVA include washers, diaphragms, gaskets, gloves, aprons, and a wide variety of mechanical molded goods.

GOODBYE TO COPPER PENNIES. The familiar copper one-cent piece will soon be no more. For the duration, anyway. The vital red metal is now of immeasurable worth in a thousand wartime uses, so the Treasury has called the "penny" in . . . replaced it with a zinc-plated steel coin. Du Pont cyanides are used in the zinc plating process.

CONTINUOUS PEROXIDE BLEACH SPEEDS PRODUCTION. The speed and economy of production line methods are now possible for bleaching of toweling and other cotton goods by the new du Pont Continuous Peroxide Bleaching process. An end-



less line of cotton is uniformly bleached at 100 to 200 yards a *minute*. Processing time is only 2 hours as compared with the 8 to 14 hours required in the older batch method. Rejects have been minimized. Other economies include substantial savings of steam, water, chemicals and labor. The quality of the work can be determined at any time and any necessary corrections made quickly. Present installations are confined to mills which can get the necessary high priority rating for construction materials.

★ ★ ★

For today, for the new tomorrow; for war, for the peace to be won . . . Du Pont will continue to develop new chemicals, improved processes, refinements in operating technique. If you have any special problem where our years of "know how" can be of help, *write:* Electrochemicals Department, E. I. du Pont de Nemours & Co. (Inc.), Wilmington, Delaware.

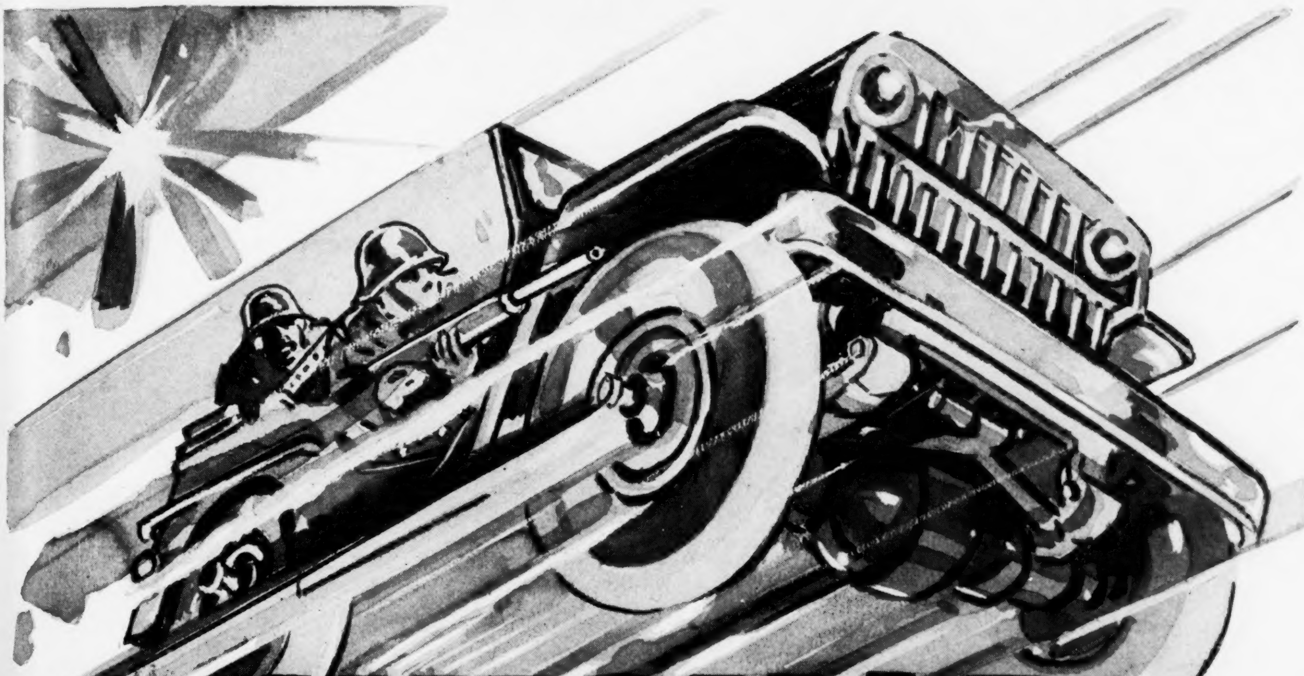
DU PONT

REG. U. S. PAT. OFF.

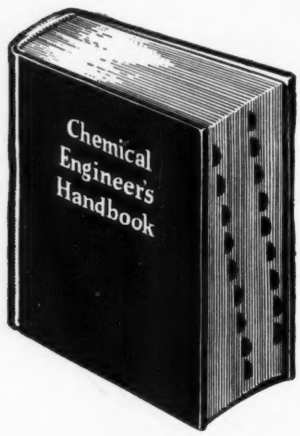
CHEMICALS

PROCESSES AND SERVICES

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY



An activated aid to processing **DARCO** REG. U.S. PAT. OFF. An active aid for purity specifications



The familiar Chemical Engineer's Handbook has a volume of about 87 cubic inches, and a total page area of 83,000 square inches.

This One Is Impressive

The same volume of DARCO—about $1\frac{1}{4}$ pounds—has an adsorptive area of some 267,000,000 square inches. This area is equal to 3,220 copies of the Handbook totaling 8,484,700 pages!

This One Is Colossal!

DARCO Has Tremendous Surface Area

DARCO particles are so fine that DARCO provides a surface area far greater than you ordinarily might expect.

This enormous adsorptive area is conditioned, in the DARCO activating process, to remove impurities from liquids. DARCO holds these impurities fast to itself . . . impurities which interfere with evaporation or crystallization in manufacturing processes, or cause color, odor, taste, or haze in the finished product.

But DARCO does not change the chemical composition of your product. Nor does it remain in the liquid. It acts physically and not chemically.

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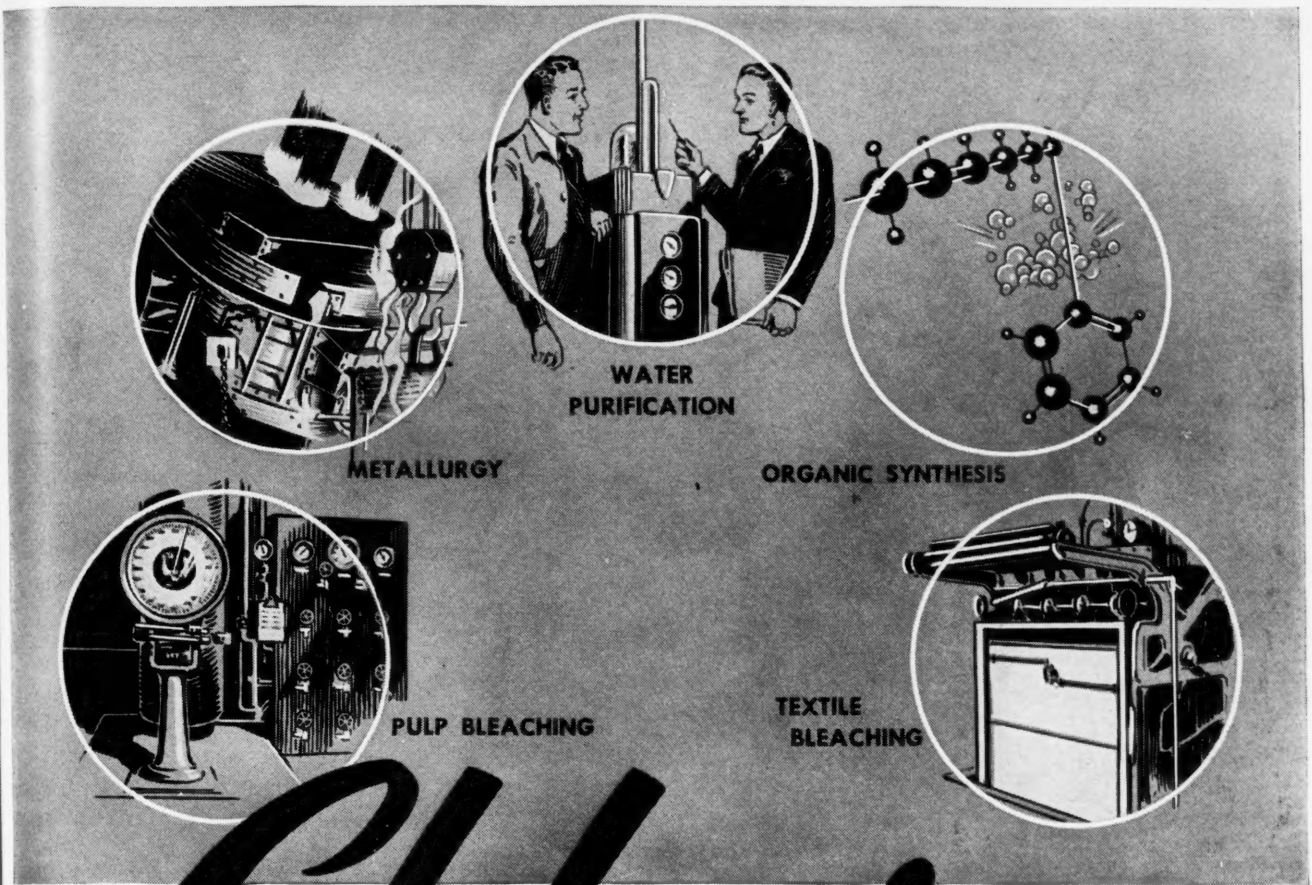

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In 1800 Tennant produced a few tons of bleaching powder. Today chemical plants in America are turning out well over a million tons of chlorine—much of which has been drafted for wartime military and industrial effort.

Penn Salt pioneered in the production of liquid chlorine, being first to manufacture it in commercial quantities. The first tank car of this essential chemical was shipped from our Wyandotte, Michigan, works in 1909. Our operations have continued to expand since that time until today our Wyandotte and Tacoma works are among the largest chlorine producers in the United States.

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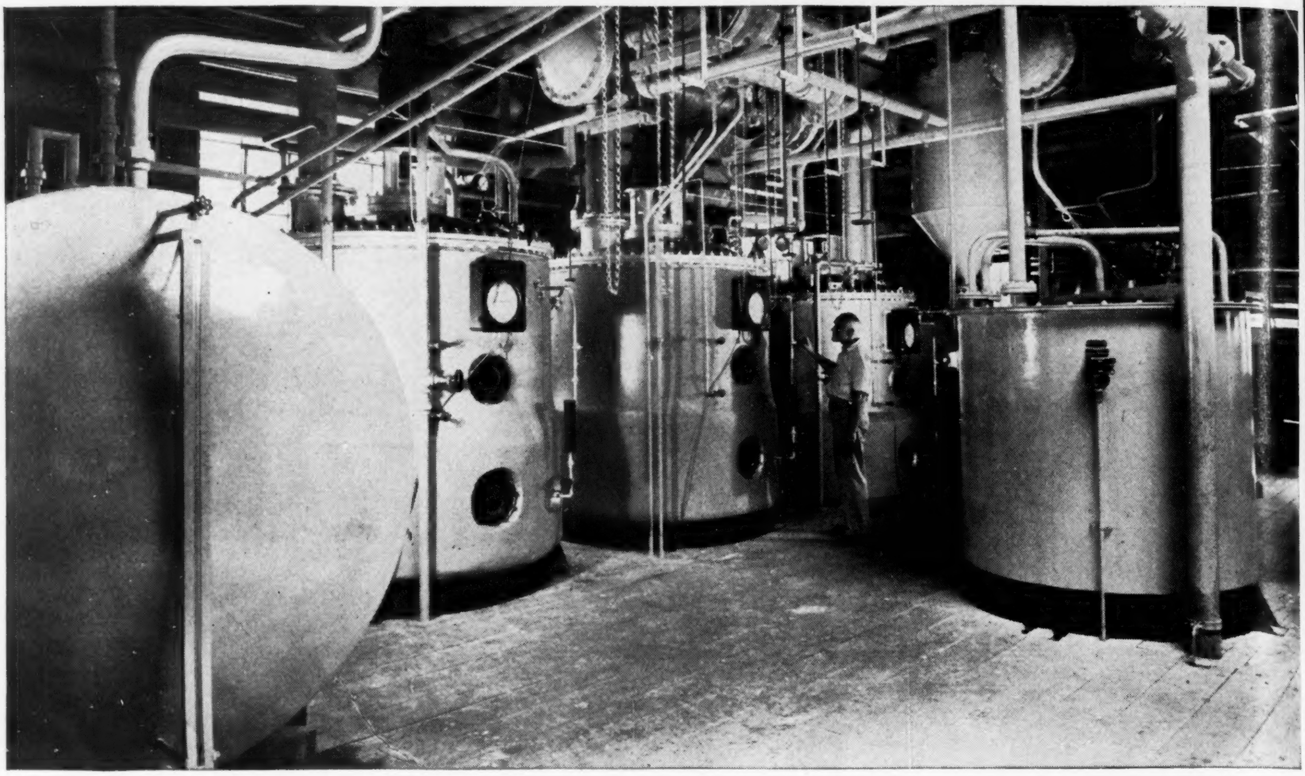
CHEMISTRY IS THE KEYSTONE OF INDUSTRY

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Safety to the Fore

C I EDITORIAL

Robert L. Taylor, Editor

Chemical industry during recent years has maintained a considerably better than average record of plant safety. National Safety Council figures for 1941, the last year for which data are available, show chemical industry as having the eighth best record in accident frequency among the 32 industries for which annual safety statistics are reported. To keep pace with the increased tempo of war work many chemical companies have intensified their safety training programs recently, and despite increased production and an influx of new workers, have been able to better previous records.

The real test of wartime safety programs would appear to be in the offing, however. Conditions favoring industrial accidents are almost sure to increase over the coming months.

One important influencing factor will be the changing character of new and replacement employees entering the industry. The majority of new employees from now on will differ noticeably in type, temperament and experience from those on which the industry has been accustomed to draw in the past. Until recently employers have not had too much difficulty in getting a good proportion of replacements from among men with previous industrial experience. Such men have usually been familiar with at least the idea of safety, and in fact have frequently contributed valuable suggestions from their experience with safety procedures in other industries. Most plant safety programs have been designed to operate under these "normal" conditions.

From now on, personnel recruits for chemical industry and all industry will necessarily come almost entirely from the ranks of women and from former white collar workers who are being forced into essential industry. The majority of both of these groups are utter strangers to industrial practice. Many are unfamiliar with even the simplest mechanical operations. Safetywise they are handicapped not only by lack of familiarity with the job, always a major cause of accidents, but by complete lack of appreciation of the fundamental concepts and importance of the safety idea in all industrial work. Such recruits will require intense and constant safety training if an epidemic of bad accident experiences is to be avoided. Needless to say, such an outbreak would damage worker morale as well as sabotage the war effort itself through loss of time and production. To prevent such possibility some companies in the chemical field are setting up or already have in operation special primary training courses designed especially to meet the needs of new employees without previous industrial experience.

Another factor that is making the safety job more difficult is the increased length of the work week. It appears to be only a matter of time until all war industry is placed on a 48-hour work week basis with overtime in addition in many cases. In this respect it is interesting to note the experience in Britain, where the 52-hour week has been official in war industries since June, 1942, while actual average of hours worked has been closer to 56. Accidents among women in British industry are reported to have increased 192 per cent and among men 42 per cent since the beginning of the war. It is not made clear whether these increases are in number of accidents or in accident frequency, but on either basis they are impressive. Long hours and inexperienced workers are given as the chief reasons. There is no reason to believe that American industry is in for any such rise in accidents, but the figures do indicate some of the potential hazards of a stage of war production just being entered in this country.

These major factors—plus several lesser ones such as more doubling up of jobs, postponed vacations, general effect of working under prolonged tension—point to a serious flare-up of industrial accidents if counteracting effort in the form of greater emphasis on safety is not provided. No time can be lost in getting such effort under way, and what is probably more important, it is going to have to have the full backing and encouragement of top management.

This importance of having active top management interest in safety is being recognized to an increasing extent by chemical companies, and its existence in individual companies is generally easily recognizable by the safety reports that are turned in. Only about six months ago one large company in the industry placed an individual of officer rank in central charge of safety and plant protection for all of its operations, with the job of coordinating and directing rather than replacing individual plant management efforts. In another large chemical company, a safety statistics summary is submitted quarterly to the president who looks it over and frequently dictates a personal note to the management of any plant having an exceptionally good or exceptionally poor record.

With manpower becoming more and more our most precious resource, its conservation through safe working conditions and safe working practices cannot be overstressed. The National Safety Council is already getting under way a national movement for promoting safety in the home and on the streets to supplement the job being done in industrial plants. Chemical industry must not be lulled into a sense of self satisfaction by its relatively good record to date. The real test appears to be coming, and now is the time to prepare. Emphatically, as far as industry's effort in this war is concerned, *"safe manpower is warpower,"* to use the punchy slogan of one chemical company, and all industry is under obligation to make every effort to conserve it.

Enter the Women: Women have always played a fundamental role in the American business and industrial scene. There were 13,800,000 of them working in various capacities at the end of 1941. Now, however, War Manpower Commissioner Paul V. McNutt has urged that the country meet and solve its serious labor shortage by increasing the employment of women to 18,500,000 in 1943. Countless housewives, schoolgirls, college graduates are leaving their orderly kitchens, classrooms, and literary clubs to take jobs for the first time in factories, transportation and public service. Chemical plants, once closed almost entirely to women, have had to open their gates to thousands of female employees since December 7, 1941.

How well is this emergency stop-gap performing? Can women do as good a day's work as men? Is their value in the labor market equal to that of their husbands and sons?

To find the answers to these and other questions, CHEMICAL INDUSTRIES' assistant editor, Miss Hannah Garry, early this year conducted a survey of female employment in a representative cross section of chemical companies. Visiting a number of plants and corresponding with others, Miss Garry asked questions like these: What kinds of work are women performing? Can they charge vats, tend boilers, weigh and load drums, use and maintain instruments? Where are women incapable of replacing men? What changes are necessary in doing heavy work? Do women cover all shifts? Is there an abnormal turnover among women? What type of training do they require? What comfort and welfare facilities must be installed? Are women more temperamental? What is the wage policy for women?

Some of the answers are surprising, some a bit startling, all interesting. The complete summary of the survey is presented in this issue of CHEMICAL INDUSTRIES, beginning on the following page. In general the women appear to be doing a creditable job. In both technical and non-technical jobs they are proving with results that they can work as well and as hard as men. It took an international emergency to admit women to chemical industry. Perhaps this newly found source of scientific and production energy will prove to have post-war possibilities.

Technical Manpower: Both reports from individuals and recent informal industry survey reports indicate that there is no immediate shortage of chemists and chemical engineers, at least not of serious proportions. One company that is normally a large employer of new graduates states that it is maintaining prospect lists but is in actual need of new technical men at present. The industry in general is finding much more urgent things to worry about for the time being.

Unfortunately, the near future portends a considerably less pleasing outlook as far as the supply of technical manpower is concerned. College graduating classes not only will be reduced in size but a larger proportion will go immediately into the armed services as soon as their studies are completed. All able-bodied young college men will be under tremendous psychological pressure to get into uniform as soon as possible. Some will leave school before graduation to join service units promising shorter routes to scenes of action. Few will be inclined to take advantage of the army order permitting draft deferment of students engaged in technical studies who can complete those studies before July, 1945. Yet those few represent all that will be available to industry. After 1945 the flow presumably will stop entirely.

This is the problem that will be faced by industry if present selective service methods and college military training programs prevail. If duration is short it will not be serious. If on the other hand duration is for more than two years the problem may become extremely serious and in fact jeopardize continued peak operation of the chemical industry for war purposes.

Progress Through Peace: Dr. Simon Flexner, who guided the growth of Rockefeller Institute for Medical Research from its fledgling days into maturity, observed on the eve of his eightieth birthday last month that medical science has *not* made its greatest progress in wartime. If we but stop and think for a moment, is this not true of all science, especially chemistry? Few if any of the great chemical discoveries have been made in time of war. War accelerates application of scientific knowledge and tends to develop new methods and techniques, but science cannot grow through application alone. As Dr. Flexner pointed out, "Progress comes most often from the quiet, the studious, the contemplative minds, which have the time they need in peace."

And the Heavens Shall Open Up: Chemical industry can expect its share of the deluge when the Department of Justice bursts forth with the mass of data and "evidence" now cramming its files waiting to be placed before grand juries and judges as soon as the last round is fired.

Although the combined efforts of the Navy and war production agencies have succeeded in calling off the dogs until the war is won, it is reported that the Anti-Trust Division now has 20 important cases fully prepared and ready for submission to grand juries and 742 other cases under investigation. It looks like 1919 several times over again.

The only course will be a vigorous and militant stand based on principles and the record. To whatever extent is possible without impeding its contributions to the war effort the industry must prepare now to meet the challenge. If there is dirty linen, be prepared to bring it out into the open. If not, be prepared to stand ground with facts.

Probably most cases will resolve down into a question of what is black and what is white. Certainly no industrial group that has made as many fundamental contributions to the progress and welfare of the American public as have chemical manufacturers can have as much black in it as some of our well-known Washington friends would have us believe.

Lois Hans of Hercules directs four men in paper making research.

Women are operating more and more of the nation's wartime chemical and process industries and are doing good work in these fields.

CHEMICAL WOMANPOWER

By Hannah Garry, *Assistant Editor*

YOU are at the entrance to Standard Oil's Bayway plant. A tank truck rolls through the gate, stops inside and waits. Within a few moments, a trim, uniformed girl escort is speeding down the road on a bicycle, convoying the truck to the pumping station. Watch that girl. She is the symbol of a change that is taking place in the chemical industries. As the war progresses, the making of chemicals—from testing, handling and storage, to processing and product control—is passing more and more into the hands of women.

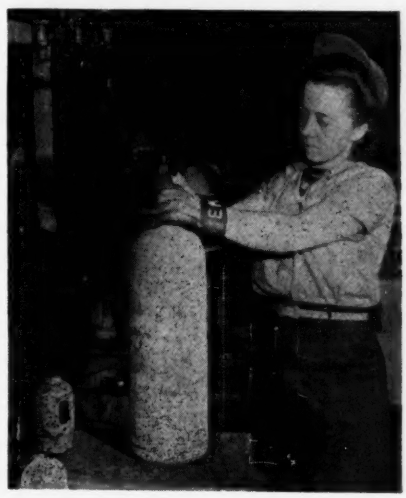
Let us look at some facts. The announced goal for the military services in 1943 is 10,800,000 men. There were 56,000,000 people gainfully employed in industry in 1941 and, according to manpower commission estimates, with the present rate of expansion there will be 62,500,000 needed in 1943. These are the simple figures. We are faced with the problem of making up the difference of more than six million people plus providing replacements for those of the 56,000,000 who are leaving for military duty. Where will they come from?

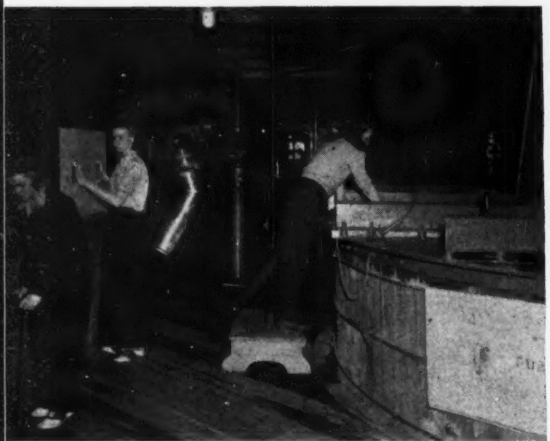
There are the physically handicapped, the over-age, the under-age, and women. The first three categories represent only a small proportion of the available labor supply, thus leaving womanpower as our greatest untapped source.

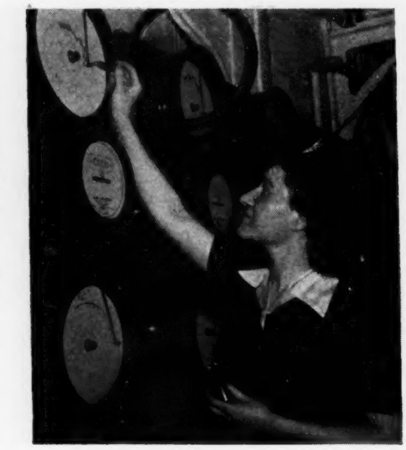
Great Britain has faced and successfully solved its manpower problem through use of women. Today more than 40% of all British war production workers are women. According to British Supply Council reports, about two-thirds of all British women between the ages of 14 and 65 are actively engaged in industry, in the uniformed services or in full-time civilian defense work. Fired by the bombs that shattered Pearl Harbor, we in the United States have already taken large strides in this direction. Since the beginning of 1942 the number of women employed in industry has increased tremendously. Here are actual instances of what has been accomplished in the chemical field. There is no limit to what can be done, to what will have to be done.

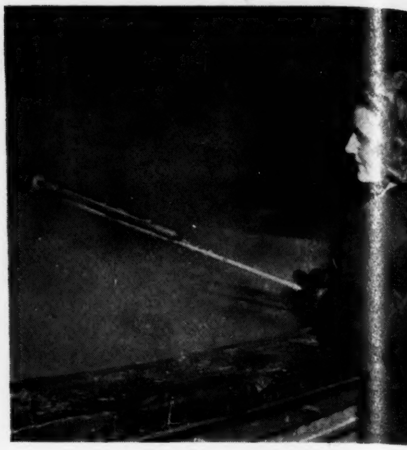
Traditionally chemical plant personnel have been almost exclusively male except for the usual women stenographers and receptionists. But extended experiences of English and American companies have shown that a woman can do practically every job a man can, apart from those requiring sheer physical strength. And even there mechanical devices can be provided to reduce the necessary physical output. According to a memorandum entitled "War-time Employment of Women in Chemical Industry," published by the British Ministry of Supply (Chemical Control Board) and prepared as a result

Attaching cylinder to feedline is Edna Keen of Du Pont, former inspector in food factory.









Left: Three Union Plant female employees, from basic working unit of five, nitrate cotton linters for smokeless powder. Center: In power house, Mary Farkas inspects instruments on control board. Right: Mary Ayres checks temperature periodically during nitration.

Union Plant of Hercules Powder Company employed its first 470 women in 1942 for the production of nitrocellulose and cellulose acetate. Center: Florence O'Such valves cotton linters and wood pulp into a room-size purification vat. Below: Florence and Ann O'Brien don rubber boots and climb down ladder into vat to flush interior of excess cellulose between charges.

of a special inquiry undertaken among British chemical manufacturers, English women are successfully doing light work, general utility work, light laboring, engineering and maintenance work. What have we done?

January, 1942, not one woman was on the payroll of Union Plant, Hercules Powder Company. A year later 470 were working the three shifts. Women were first accepted in the company cafeteria, and as the need for workers grew acute they were transferred to actual production. Not only did they prefer chemical manufacturing but they proved so capable that large scale hiring began. In the nitrocellulose buildings where they today comprise 60% of the total labor force, the women operate a large part of the nitrating process for the production of smokeless powder. When wood and cotton linters enter the unit, girls valve them through shredding machines, then charge room-sized vats with the fibers, control the nitration operation, pull the linters out when nitration is completed, supervise the soda and neutral boils, wash the nitrated cellulose, take temperatures and samples periodically, drain the vats, and then climb down ladders into the tubs to clean them between charges.

During our visit to the plant, we spoke to one of the girls comfortably dressed in blue denim coveralls. She was scarcely 5 ft. tall, about 18 years of age, and poised with the ease born of training and months of experience. Yes, she preferred working in the chemical unit to serving in the company cafeteria. After all, a life-time of cooking food and washing dirty dishes awaited her when she married. But now she was doing a real mansized job, active in the defense of her country.

Hercules has found that groups of five girls, with one designated as leader, working together without male help form a good basic unit. Previously the continuous digester coils of the nitrocellulose plant were operated entirely by men. Today girls run the operation and are completely at home in a once alien atmosphere of steam and acid.

Have you ever seen vat handlers? Well, we were surprised by the slim girls, wearing slacks and blouses, bright bows in their hair and gaily colored turbans, working side by side with the men, sharing this labor. They shoulder shovels, pack buckets with cotton linters and wood pulp, handle and dump barrels of pulverized cellulose acetate. About 75 lbs. is the maximum a woman can manage unaided; two generally lift a 100-lb. carton.

Plant management at Union shows its confidence in female responsibility and intelligence by assigning two women to run the entire acetic acid recovery plant. In the power house, women oil huge generators and air compressors, record pressure, temperature, and kilowatt readings for office inspection, maintain instruments in working order. If a potentially dangerous condition arises in the plant, a warning alarm rings in the power house and the girls are quick to correct the situation.

What is true in Hercules' Union plant is proving true in the new butadiene and styrene plants, has been true for many years in rayon and nylon plants, is an accomplished fact the country over. Women can do practically every job that men can.

Throughout the chemical industries women are operating cranes, drill presses, lathes taller than themselves, checking scales, running control panels, weighing materials, sewing and labeling bags, lining, painting, and capping drums, painting buildings, boilers, and plants. As operators' helpers they study analyses and learn to know their materials, turn valves, operate loading machines, direct crane operations. One large southern New Jersey company with several hundred women on its payroll is training some

of them to police its grounds, while other plants point proudly to the new safety records their women truck drivers are achieving. Recent college graduates from women's schools are being trained by Du Pont as college men formerly were and are being sent out into production areas and plants to supervise manufacture.

Although women in chemical plants are largely a phenomenon original with 1941, female college students have been trained in chemistry for many years, and upon graduation, if their incantations were granted, they became teachers, librarians, chemical stenographers, or minor control technicians. But today, according to Dr. Helen I. Miner, reporting to the American Chemical Society, the scope of opportunities for women in industrial chemistry is almost unlimited. And the number of these opportunities is restricted by the supply of women rather than the demand. In fact the Bureau of Occupations of Hunter College, largest college for women in the United States, says that these days graduates have to select carefully the firm offering the type of vocation they desire or they will be sidetracked in their careers.

It was only a few years ago that women were first employed in the Cellophane Research laboratories of Du Pont's Rayon Department in Buffalo. Today in a group of 60 people, 12 are women, four of whom are doing research work and the remainder are technicians assisting research chemists. At the Hercules Experiment Station in Wilmington, 13 women held technical posts in December, 1941. A year later the number had swelled to 48 chemical engineers, chemists, and technicians—one woman for every five men on the technical staff, which now operates a regular night shift. One attractive young college graduate who majored in biology now operates the electron microscope.

So great is the demand for woman chemists that college seniors can sit back and wait for the best position offered by competing company scouts. Even graduates of '39 and '40, who sold cosmetics over counters or filed letters after framing their A.B.'s, are finally entering industrial laboratories. Too many of those whose training and abilities qualify them for responsible positions are still selling cold cream. An alert personnel department will find graduate lists of the past few years fertile fields for investigation.

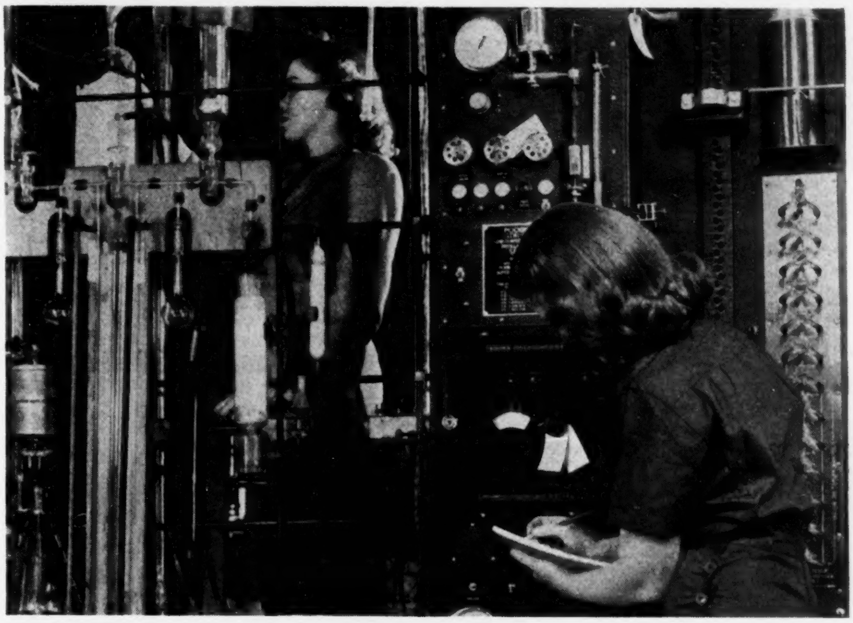
At Standard Oil Development Company we spoke to a quiet, competent young woman who had majored in bacteriology at Cornell University. She had been employed at Lederle Laboratories for one summer and then worked in General Food's central laboratory for two years. Finally determined to get into the field of chemistry she mailed to Standard Oil her application for employment as a chemical stenographer. To her bewildered delight she was accepted as a chemist and, reports E. L. Baldeschweiler, Standard Oil laboratory official, has proved highly efficient.

In some of the chemical plant jobs where women are substituting for men the physical effort has been reduced. As men are generally taller and stronger than women, laboratory equipment has been lowered, light doors and lids substituted for heavy ones on tanks, and hoists installed to center work on lathes. Several plants provide temporary assistance by men or have one man in the department to do the heavy work. The general substitution ratio for heavy physical labor is about 4 women for 3 men or sometimes 3 for 2.

Women work right around the clock, all three shifts, and overtime when necessary. There are few part-time jobs for women in America but the British have introduced four-hour-per-day evening work for married women. In areas where labor is critically short as in Buffalo, superintendents of chemical plants are preparing a part-time system for some operators. After school hours high school students are employed in many company laboratories completing routine control tasks. The employment of married women raises a number of problems. Absenteeism, for example, is usually high among such women who have to shop for themselves and their families. Providing special shopping hours and facilities for women solved this problem for one firm.

Labor turnover is slightly greater than

Jean Bartlett, former bank typist and page, and Josephine Noonan, once salesgirl and packer in five and dime store, work in Standard Oil's Paratone Laboratory producing oil for Russia.



Edna Brinkruff, high school graduate with Victor Chemical, tests sodium oxalate for flares.

Pauline Sutton covers pipes in Du Pont plant. Foreman taught her under WMC training program.

with men but is not abnormal. Women who leave usually do so during the first month of employment, and their treatment during this period will determine whether their introduction is successful or not.

Jobs are so plentiful that unless interest in the work is stimulated, women will accept other employment. These incentive methods have proved successful:

1. Each woman must be made to understand the interconnection between her particular work, the entire production scheme, and their relation to winning the war. 2. House organs arouse a healthy spirit of plant cooperation; the gossipy variety are extremely popular with women. 3. Workers will look forward to meeting their friends in clean, attractive recreation rooms where smoking is permitted. 4. If outside eating facilities are not convenient to the plant, a well-equipped cafeteria is a "must." This is especially welcomed by women who prepare food for a family every day in the year. 5. Encourage ambitious employees to read the semi-technical books in the plant library. Earmark such people for future training.

Above: Mary Freeland studied art at college, now does some mechanical drafting, photographic printing and developing for Monsanto. Hilda Singleton majored in painting at Univs. of Ill. and Mexico, is employed in mechanical drafting. Below: Studying elementary chemistry and plant operation in Univ. of Pittsburgh four-months course, these girls learn to operate temperature and humidity controlled tray dryer for Koppers' synthetic rubber plant.

When women enter a plant, they almost always take over where the men left off. Occasionally, as for example at Victor Chemical Company which was once strictly a man's domain, a careful analysis of each job is made to determine the age, experience, and training required of women replacements. One New Jersey dye plant has completely realigned its operation methods, creating new types of work especially designed for women.

To weed out undesirable applicants, simple intelligence and aptitude tests are used to determine dexterity, mental and muscular reactions. Koppers United Company, Pittsburgh, employs a battery of such tests including personal audit, vocational interest, mechanical aptitude, arithmetic problems, physical science, verbal and mechanical comprehension. These also indicate for which type of work in the plant the applicant is best fitted.

War Manpower Commission's "Training Within Industry" program is proving its value in results on the production line. An article in the March, 1943, issue of *Chemical Industries* discussed such a program in detail. Averaging from three weeks to twelve months, the training period depends upon the type of plant job. As to results, girls whose formal education ended in the 7th and 8th grades and who once sewed seams in dress factories now control temperatures and viscosities throughout an entire cellulose acetate plant.

"Women have little scientific and mechanical familiarity" is the 1942-43 corrected version of "women have no scientific or mechanical ability." To remedy this, stenographers, housewives, school teachers, bookkeepers, salesgirls, and beauty shop operators are learning skilled and semi-skilled work at University of Pittsburgh classes for the Koppers United Company, Butadiene Division. The course of 160 hours covers essentials of chemical process equipment and operations. It is primarily a laboratory course, with considerable time spent in handling pilot

plant equipment. At Geneva College another course is familiarizing women with laboratory analytical techniques and special equipment. Not only are these courses tuition free, but the girls are paid for attending class plus transportation expenses and are guaranteed full-time jobs if they pass with reasonably good grades.

Engineering, Science and Management War Training courses, given by the U. S. Department of Education, are another fruitful hunting ground for personnel executives. Almost 80% of these classes at Columbia University in New York are devoted to the training of women who will soon move into professional war work. According to A. Dexter Hinckley, Institutional Representative, at the time the courses are completed one-third of all trainees will be already employed and the second third will be placed within a month. Two months following the completion of each course, all trainees will have been placed.

Because of the large labor turnover due to war conditions, women are advancing more rapidly than men formerly did, and therefore have to learn an unusual number of new functions within a short space of time. This may result in mental confusion and indigestion. However, much depends on company policy and management. Where the women know they are merely temporary replacements and cannot make a career of their jobs, they prefer remaining at the work already mastered rather than learning the details of a new job even if it entails a wage increase. But the ex-billing clerks, packers, and bank pages in Standard Oil's control laboratories, assured of opportunities equal to those of men, are voluntarily attending outside chemistry classes and studying in the technical library at the end of their working day. Courses in elementary and advanced petroleum chemistry, given by company men, are popular with girls who look forward to promotions from routine jobs.

Essential accommodations introduced for the convenience of women include wash rooms with shower stalls, a few easy chairs in the smoking rooms, and individual lockers for working clothes. A leading chemical plant supplies free hand cream and lotion, applying female psychology in its effort to make chemical manufacture more attractive to women. It also provides a large conference room where girls stop to smoke and chat while waiting for the homebound bus. None of the plants contacted had nursery facilities. Working mothers are helped by city and county organizations or arrange for the care of their children at home.

Special women supervisors or forewomen are excellent channels of approach to the management and can usually deal with general welfare matters. Because of their greater familiarity with the employees and their problems, they will usually be the first to recognize difficulties and to suggest improvements. Take Mrs. Hammel, women personnel supervisor for Hercules. She explains the relation of a new employee's work to the rest of the plant, covers the safety provisions and program, and has even been asked by the women to help solve their family problems. Considering the number of women she supervises, her knowledge of their backgrounds and education and her pride in their excellent achievement speak well for employer-employee harmony. At Monsanto, part of Mrs. Loretta Moushey's job as assistant director, Industrial Relations Section, is to make the women feel at home in the 18 American plants of the company. She directs overall women employee matters such as accommodations, rest periods, equitable wage policies.

Throughout the industry the general wage policy is equal pay for equal work. One large corporation claims to have overcome the prejudice against women in its older plants and established an equal wage policy for men and women. Salary differentials obtain where the men do all of the heavy physical labor in a department and therefore request \$.05 to \$.10/hour more than the women. In the professional group men receive higher salaries than women because in many cases they have families to support. But it is true that frequently women earning lower salaries also have families to maintain, especially in this day of an 11,000,000 man army.

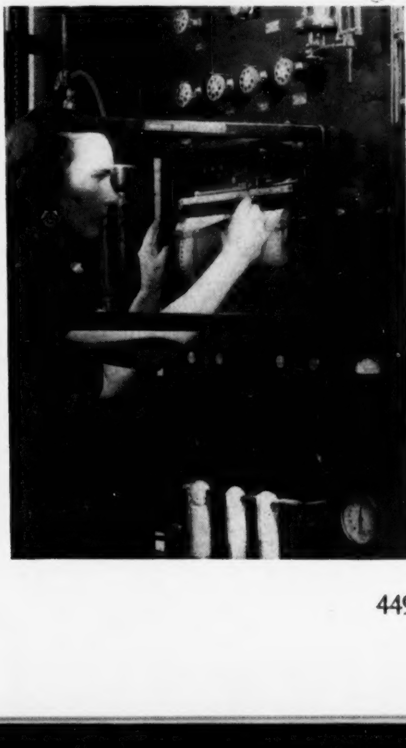
After December 7, 1941, most states relaxed their regulations concerning working hours for women. Plant superintendents have found state officials cooperative in removing restrictions on how long and when women may work. Pennsylvania changed its 44-hour limit to a 48-hour, 6-day basis, enabling women to work around the clock on all shifts. New Jersey now issues special permission to war plants to hire women on the night shift.

Employment directors of today have to "sell jobs" rather than "buy labor." Koppers United used some advertising, a fair amount of editorial publicity and a maximum number of personal contacts in order to obtain its personnel prospects. Women's clubs, churches and other community groups and gatherings were addressed on the work to be done and the kind of workers needed at the new synthetic rubber plant at Kobuta, Pa.

More fear than fact veils the question of personality adjustment. Women pioneering in new employment fields, are being praised for their fine adaptability and teamwork. At first men may resent women replacing them. One young man upon discovering that a girl could do his job as well as he rushed to enlist in the Air Corps. However, given the explanation that the manpower shortage may cripple our ultimate victory, most men are eager to cooperate.

We asked executives, "What will happen to these women when the war ends?" The replies were pretty well in agreement. Many women will return to their homes, and some men will not return to their jobs. Companies that have invested much money in training women will keep them. There will be little displacement in those plants that expanded and intend to keep expanding; others will have to cut back to normal size. After the war the mediocre women may be retained as assistants to relieve men of routine details and duties. The creative ones will be assured of permanent positions and will be encouraged to further develop their abilities.

Left: Chemist's assistant for General Electric is Verna Penney, B.A. from Wheaton College, employed in analyses of metals. Right: Charlotte Mahe majored in bacteriology at Cornell, now distills gases in Standard Oil laboratory.



War has forced basic changes in the alcohol picture. Pre-war U. S. production of industrial alcohol was 120-150,000,000 gal. annually. The past two years have witnessed jumping of 1943 demand estimates from 300,000,000 gal., to 1,000,000,000 gal., back to 540,000,000 gal. Attainment of this quadrupling of normal output has been greatly aided by swift conversion of the beverage industry, greatly complicated by non-availability of molasses. Our author, closely associated with the situation, discusses some of the problems and their handling.

Wartime Developments in the Alcohol Industry

By P. A. Singleton, *Assistant to the President, New England Alcohol Company*

THE submarine hazard and eventual total cessation of tanker movements from the West Indies to Atlantic seaboard industrial alcohol plants has forced a change from blackstrap molasses to grain as the principal raw material of the fermentation alcohol industry, and has compelled conversion of whiskey plants to 190 proof alcohol. This was necessary merely to *maintain* normal output.

Expansion of production from the normal 120-150,000,000 gal. a year to a final 540,000,000 gal. goal set by WPB involved still more complications. The program was snarled in the very beginning in that all capacity increases had to be designed to use whatever substitute could be found in war markets to replace cheap by-product molasses from the Caribbean sugar industry, long regarded as the logical raw material because of easy transportation and readily available fermentable content. Grain won out.

Unless subsidized, the new grain plants and plant conversions could not be economically feasible under post-war conditions. Hence an overall government financing program was required. Considerable emphasis was placed on simplicity, quick results and low cost in order to minimize wartime expenditures, temporal in nature. Shortages of critical metals and bottlenecks in fabrication of process equipment remained an ever present factor compelling new sources and new ideas.

Wartime Demand

Ethyl alcohol is a vital war material in great demand both for expanded normal uses and in tremendous additional quantities for many new military and essential civilian needs. It is an important ingredient in smokeless powder—about ½ pound being required for each pound of smokeless. It is being used increasingly as an industrial solvent, in protective coatings, in the plastics industry, in medicinals and pharmaceuticals, and as an anti-freeze for motorized equipment. The synthetic rubber program has called for ethyl alcohol in great quantity. Lend-Lease has exported tremendous gallonage.

How Much Needed?

On March 28, 1942, Dr. William J. Hale, chemical consultant of Midland, Michigan, told a Senate Agricultural Committee that a billion gallons of industrial alcohol (700,000,000 gallons more than he said the Government was counting on producing) would be needed by the end of 1942 if we hoped to win the war. He listed smokeless powder, synthetic rubber, plastics and power fuel as essential uses. His estimated requirements were as follows:

50,000,000 gal. for manufacture of smokeless powder
100,000,000 gal. for underground storage
100,000,000 gal. for anti-freeze solutions
200,000,000 gal. for solvents, lacquers and plastics
50,000,000 gal. for airplane fuel
500,000,000 gal. for synthetic rubber

Dr. Hale declared the cheapest way to produce alcohol would be from farm crops—corn, rye, barley and other grains.

Almost concurrently, WPB Materials Director, William L. Batt, announced a program for substituting grain for molasses as a source of raw material for alcohol. Saving of the equivalent of 550,000 tons of sugar, a popular appeal quickly picked up by the newspapers, was claimed.

The Official Program

Two months later on May 25, 1942, A. I. Henderson, the new Director of Materials, issued a WPB report on alcohol-making facilities in the United States. Military and essential civilian demand, although less than Dr. Hale's estimates for 1943, had been upped to 476,000,000 gal., including 200,000,000 for butadiene. Current production capacity was estimated at 540,000,000 to be added to a stock pile of 50,000,000 gal., the surplus from 1942. Attainment of the 540,000,000 gal. capacity was predicated upon conversion of the whiskey industry to industrial alcohol and full time operation of all industrial alcohol plants in the country, apportioned as follows:

Synthetic ethanol (from ethylene gas)	65,000,000 gal.
Whiskey plants already making 190 proof	120,000,000 gal.
Whiskey plants to be converted	120,000,000 gal.
New Orleans industrial alcohol plants (sufficient blackstrap residue from domestic sugar production being available to continue operations)	65,000,000 gal.
Seaboard industrial alcohol plants	160,000,000 gal.
Cuba and Mexico	10,000,000 gal.

Practically all this production was to come from grain. The beverage alcohol plants already used grain exclusively. The program contemplated installing grain handling equipment at all eastern seaboard plants so that they could use either grain or blackstrap molasses if the latter later became available from Cuba and other sugar producing islands off the East Coast.

Beverage plants that could produce 190 proof were to operate full time; those that could make only 120-140 proof were to ship their output as high wines to industrial alcohol plants for rectification to 190 proof. It was hoped that the latter high wine plants could eventually be converted to 190 proof. To accomplish this, 20 rectifying stills from Pacific Coast plants and 6 from idle distilleries in other parts of the country were to be installed in whiskey distilleries, chiefly in Kentucky, to enable straight run production of 190 proof.

Conversion vs. New Construction

Advantages of *conversion* instead of *new construction* were pointed out, WPB noting that 550 tons of steel plates, 790 tons of structural steel, 70 tons of copper and 4 tons of bronze were needed for the construction of a *new* plant that would turn out only 2,500,000 gal. of alcohol a year. One hundred such units would have been necessary to equal the output of the beverage industry.

This revised 1942 program was estimated to consume 136,000,000 bushels of grain. Corn, rye and wheat were being used in the order mentioned, but a large increase in the use of wheat appeared necessary because of available surplus of wheat.

The government program was triple-edged: it provided for (1) conversion of the beverage industry, (2) conversion of industrial plants, (3) construction of new plants.

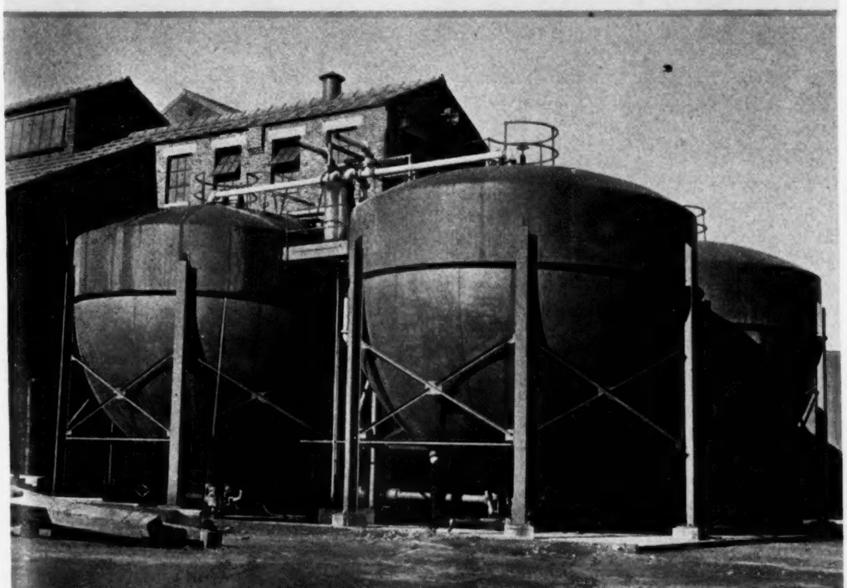
How to Get the Needed Increases?

To speed conversion to 190 proof in the beverage industry, existing technicalities were brushed aside. Congress passed H.R. 6543 and removed the first barrier to the redistillation of high wines into 190 proof, authorized simultaneous production of industrial alcohol and beverage alcohol, and also permitted these plants to operate 7 days a week. Straight run grain alcohol output was inadequate to meet war demands; all distilleries did not have equipment to rectify 190 proof. With H.R. 6543 passed, it became possible to gather the low proof alcohol from beverage plants and ship it to industrial alcohol plants for rectification.

Under provisions of the Redistillation Bill, passed April 2, twenty-five distilleries in Kentucky and Eastern Pennsylvania started to ship bourbon and rye "high wines" to commercial alcohol plants. The initial program was described as an experiment, expected to be made permanent if preliminary tests proved satisfactory. Thirteen distillers in the Kentucky area were to ship their output to Commercial Solvents Corporation at Terre Haute, Indiana, and twelve alcoholic beverage distillers in Maryland and Eastern Pennsylvania were to ship to U. S. Industrial Alcohol Company at Yonkers. Eventual arrangements were made whereunder four New England distillers were to ship to New England Alcohol Company at Everett, Mass., for rectification.

Implementing distribution and control orders were issued by WPB. Order M-69 was intended to direct the output of beverage distilleries into commercial alcohol production. After January 15, 1942, no producer was permitted to operate his equipment except for the production of 190 proof distilled spirits or high wines for industrial alcohol. M-54 on molasses prohibited the use of molasses for making beverage spirits and set quotas limiting the use of molasses for other than alcohol production.

75,000-gal. fermenters at New England Alcohol Co. Originally designed to make alcohol from molasses, they now operate on wheat flour.



Basic throughout the alcohol industry is General Preference Rating Order M-30, which since the first part of 1942 has channeled the output of all alcohol plants into uses that are essential. Quotas have been set for less vital uses, and restrictions have been made more severe as civilian activities have been curtailed.

On April 20, 1942, the Office of Defense Transportation formed an Industrial Alcohol Traffic Advisory Committee for the purpose of streamlining transportation arrangements on movements of molasses, industrial alcohol and high wines. The Committee was headed by Ralph R. Luddecke, with membership including Charles W. Braden, New York City; Roy V. Craig, Chicago; Edward Gusky, New York City; Frank H. Luther, Louisville; H. W. MacArthur, New York; H. E. Seel, Terre Haute, Ind.; and C. L. Weatherholt, Louisville. It has accomplished extremely important work in the face of critical shortages of tankcar equipment.

On July 6, WPB announced that the beverage distilling industry had made rapid progress in converting its facilities and that distilleries throughout the country were manifesting a fine spirit of cooperation. John B. Smiley, Chief, Beverages and Alcohol Branch, noted, "With our granaries bulging with surpluses to such an extent that additional storage space is being sought for this year's crops, there can be no doubt of the benefits to American agriculture from the use of grain in the production of this alcohol by the beverage distilleries, and the American breakfast table is not being deprived of a single crumb of food as a result."

On September 22, the Distilled Spirits Institute announced that full quota assigned to the beverage industry of 240,000,000 gal. would be met; that surplus grain amounting to 100,000,000 bushels bought by the Government and for which no other market existed will have been used and that the alcohol produced would be sufficient to produce 200,000 tons of synthetic rubber.

Thus the beverage industry took nearly one-half of WPB's quota of 530,000,000 gal.

Second phase in the Government program was conversion of the industrial alcohol industry. What type, where, and when to build, related directly to the problem of raw material to be used. The

primary ponderable was marine transportation. Its cessation because of war risk caused serious disruption in the West Indies where "ditching" of molasses has become necessary in order to make place for the next batch of by-product molasses from the next year's sugar production.

Shipments from Haiti, Puerto Rico and Cuba never have been resumed. Naval convoying of molasses tankers has been urged, but to date action has been impossible. It is understood that West Coast alcohol plants have received some quantities of molasses on return voyages from Hawaii but this factor has not been substantial in the national picture.

Raw Material

A great many possible substitutes for molasses have been considered: potatoes, waste sulfite liquor from pulp mills, raw sugar, hydrol (corn syrup), corn and wheat. None of these can compete with cheap blackstrap as previously available at by-product cost. All have offered varying degrees of promise under the impetus of current conditions, where urgent wartime demand has made raw material costs a factor secondary to that of getting additional capacity quickly.

The feasibility of dehydrating molasses in the West Indies so as to permit dry cargo shipment (these vessels being much less critical than tankers) has been explored but up to the present time found impracticable because of difficulty in drying properly and high cost of handling plus the difficulty of procuring the special vacuum equipment needed and getting it installed at the molasses plantations.

The U. S. Citrus Laboratory in Florida developed a method for the manufacture of industrial alcohol from juices extracted from citrus pulp in the manufacture of cattle feed. Laboratory officials said the process would make possible the manufacture of the alcohol at a price that would warrant production even after the war. The disposal of the refuse heretofore has been an expense to canning and feed plants, it was pointed out, and disposal by the new method will be a pure gain. No commercial exploitation of this development has yet been publicized.

Alcohol from petroleum has, of course, been a fairly steady and substantial factor in the alcohol picture; OPA has set special prices for this material and production from petroleum has been a highly satisfactory contribution to war requirements. If grain becomes short, further expansion may be mandatory.

As early as August 26, 1941, the Department of Agriculture through the Commodity Credit Corporation offered to make 20,000,000 bushels of Government-owned corn available to the War Department for the production of alcohol for munitions manufacture. Secretary Wickard pointed out that "using corn in the manufacture of industrial alcohol will further the national defense effort by making available more alcohol and by *freeing tanker space* needed for the shipment of strategic material. It would also aid the agricultural situation by removing surplus corn and making increased corn storage space for the 1941 crop." Use of the 20,000,000 bushels of corn was expected to save 100 tanker trips to the West Indies which would have been necessary to move the approximately 125,000,000 gal. of molasses to produce the expected yield of alcohol of 50,000,000 gal. (This was long before full war demands for alcohol had been foreseen.)

Third phase in the government program —new construction—was carried through. On December 20, WPB announced that it planned to engineer in advance a series of individual alcohol plants, plans to be completed in advance and then "laid on the shelf" until needed. These plants were to be built to take care of part of the 100,000,000 gal. increase in alcohol recommended by the Baruch Committee report. Plants were to be designed and approved by an Engineering Advisory Committee of the Alcohols and Solvents Section, were to have a capacity of about 12,000 bushels per day which would be equivalent to approximately 10,000,000 gal. per year production of alcohol.

New Construction

Almost concurrently, it was announced that three new grain plants would be constructed, one at Omaha, Nebraska, with annual capacity of 17,000,000 gal. produced from farm products; a second plant at Kansas City, Missouri, with an annual capacity of 15,000,000 gal.; and the third at Muscatine, Iowa, with an annual capacity of 8,000,000 gal. Plant at Omaha would be operated by the Farms Crops Processing Corporation of Nebraska; the one at Kansas City by National Distillers, a New York corporation; and the one at Muscatine by the Grain Processing Corporation of Iowa. It was definitely asserted that these projects would not be permanent under any stretch of the imagination, that peacetime cost of alcohol from grain was too high to justify operation.

On March 9, 1943, five more new grain plants were announced by WPB, the minimum output of which it was stated would bring alcohol production to a level where all projected requirements can be met. Prospective lessees were named as the Iowa Farm Processing Cooperative for the site at Dubuque; the Consumers Cooperative Association at Keokuk; Joseph E. Seagram & Sons, Inc. at Carrollville, Wis.; Schenley Distillers Corp. at Moline, Ill.; and Hiram Walker & Sons, Ltd. at Peoria.

The price at which alcohol can be sold has been a basic factor in conversion. Both OPA and WPB are here involved. Selection of raw material and type of equipment have necessarily depended upon selling price set by OPA. In many cases, process adaptations desirable from an economic standpoint have been foregone because of unavailability of critical materials or the fact that WPB would not allocate these materials for such "desirable" but not absolutely mandatory technical features.

Economic Considerations

On September 15, 1941, OPA met with the heads of various alcohol producing companies to state its objective, then to freeze prices at August 1 levels as published in trade magazines during the last week in July.

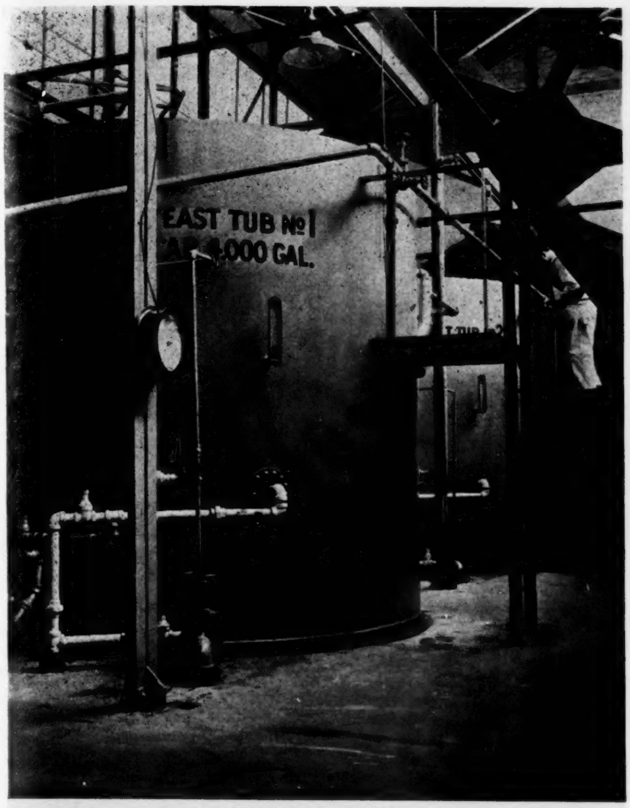
This voluntary action was formalized by OPA in Price Schedule 28 issued September 15, 1941, setting a price of 24½ cents per wine gallon on the basic industrial formula SD2B. Subsequent to that date minor exemptions were granted as in the case of a few individual high cost producers.

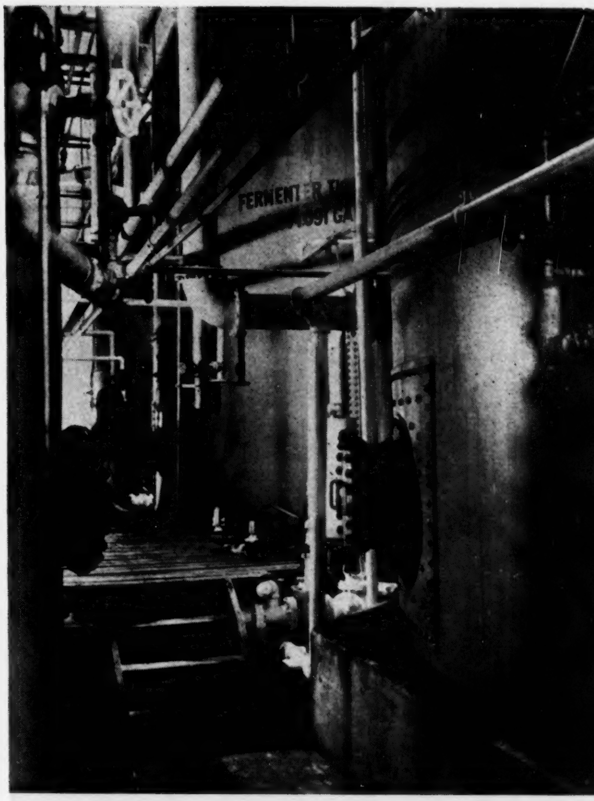
For example, OPA granted permission to Publicker Alcohol on November 7, 1941, to produce 4,000,000 gallons of alcohol to sell at 49½ cents per gallon, made from Cuban sugar at $2.30 per hundred pounds. Similar exemptions were granted in the case of ethyl alcohol used in the manufacture of synthetic rubber. However, the 24½ cent ceiling price offered a flat obstacle to proposals for grain conversions. Raw material cost alone far exceeded the market price on alcohol.

The 24½ cents ceiling was predicated largely on then existing costs of molasses, the basic raw material for alcohol. As freight rates increased with marine hazard and shortage of tanker facilities, delivered cost even on molasses alcohol reached the point where operation under ceiling price was impossible.

Finally on December 18, 1941, OPA revised its price schedule effective January 1, 1942, to set a ceiling on SD2B ethyl alcohol, whether synthetic or produced by fermentation of molasses, corn or other material. Further, in the case of alcohol produced from the fermentation of molasses, the price was geared to molasses cost per 100 pounds of sugar content delivered to the producer's plant. For each increase or decrease of 10 cents in sugar costs from the price at which Defense Supplies Corporation purchase the entire Cuban sugar crop, the maximum prices for ethyl alcohol would be the schedule price plus or minus 1½ cents per gallon of alcohol.

The 50 cents per gallon selling price on alcohol permitted continuing operation of seaboard plants on molasses at then existing cost. In January of 1942 some molasses was still coming into this coun-





Yeast made up in molasses is introduced into the cooked slurry of wheat flour and malt in the granular wheat flour process. Fermentation requires three days at temperature below 92 deg. F. Yields are in neighborhood of 10 per cent. This process is more vulnerable to infection than molasses process.

try, principally via Gulf ports. All such molasses was pooled and shipped under the auspices of Defense Supplies Corporation (with partial freight subsidy) to various molasses alcohol plants.

By late Spring of 1942, tanker movements even on the shorter haul to Gulf Ports had dwindled seriously, and overland rail movements of molasses from New Orleans and the Everglades had become increasingly uncertain because of tank car shortage, the cars being interchangeable for use on fuel oil.

With optimistic hopes but no action possible on Naval convoying or release of more tankers for molasses, prospects seemed remote for continuing operation of the Eastern Seaboard molasses plants at full capacity.

Because of these economic aspects, Reconstruction Finance Corporation through its subsidiary, Defense Plant Corporation, undertook financing of the conversion to grain for some producers. Plans of operation on whole grain progressed slowly, however, largely because of extensive changes necessary to convert, and difficulty in getting the materials and priorities to do it.

Beverage Industry

Clearance for conversion (from selling price standpoint) of whiskey distilleries was handled more simply. OPA issued a special exemption to Price Schedule 28 on September 28, 1942. This amendment punctured the ceiling by setting the price per wine gallon of ethyl alcohol as the cost of raw materials, plus cost of direct labor, plus other conversion costs, plus plant overhead, plus general and administrative expense, (not in excess of 3 cents per wine gallon) less recovered values of dried feed, fusel oil and other products, *plus* 4 cents per gallon. The alcohol was purchased by Defense Supplies Corporation, a second subsidiary of RFC. This program was to be a temporary measure only and to terminate on March 31, 1943, in the belief that thereafter the converted whiskey distilleries would be able to produce alcohol at prices under the then existing selling price in competition with other producers. This gave quick impetus to the distillery conversion program.

A corresponding exemption was made in the case of distilleries not able to rectify to 190 proof. Allowable selling price on high wines was set on a cost plus basis with somewhat smaller allowable administrative expenses and margin for high wines producers. As a result, net cost to the Government on such high wines, most of which were produced for the account of Defense Supplies Corporation, was considerably above 50 cents per gallon. However, incentive was given for a number of entrepreneurs to try to rehabilitate idle plants, convert breweries, or start up operations with bankrupt distilleries, several with the aid of federal financing. Net result was the addition of considerable "high cost" capacity as a supplement to existing production.

Industrial Alcohol Industry

A comprehensive program of government assistance was needed. At 1941-1942 price levels alcohol from grain simply could not compete with alcohol from molasses, and it seemed certain that after the war the availability of low cost by-product blackstrap molasses from the sugar industry would result in a reversion to this situation. Thus private financing of capital expenditures for grain plants could not be justified. Government financing through DPC was therefore offered. Market prices and supply prospects on grain were highly uncertain. Special Commodity Credit Corporation prices on grain used in alcohol production had to be made available through the Department of Agriculture in order to make possible the use of grain.

The first Commodity Credit program involved the sale of wheat at 80 cents per bushel and corn at 90 cents per bushel for use in alcohol production, this being considerably below normal market levels. Contracts were made on a quarterly basis. Most distilleries preferred to use corn exclusively because of easier handling, better yields, less difficulty with foaming and simpler slop disposal problems. However, as crop surpluses dwindled and

Lend-Lease shipments increased, it became necessary for CCC to change the allowable ratios of corn to wheat from 100% corn to 60-40, to 50-50, to 40-60, and finally WPB had to instruct engineers designing grain conversion plants to design for 100 per cent wheat, the worst material from the standpoint of foam handling and slop drying.

Slop Disposal

Almost concurrently WPB had to take the position of flatly refusing to approve priority requests on *any* drying equipment because of growing shortage of critical materials, particularly the oil fired or steam dryers and other handling equipment incident to distillery slop recovery and disposal.

This had doublebarreled economic shortcomings: First, it deprived alcohol producers of the financial advantages of slop recovery in the form of dried distillers' grain, a somewhat perishable material (resembling bran flakes in appearance) which was fairly readily salable in local markets for animal feeding. A few distilleries were able to dispose of slops in semi-liquid form, but the handling was difficult and the market unstable. In winter slops were readily salable because of the shortages of green feed; in summer when disposal problem became acute because of spoilage, odor, and flies, the material became unsalable because of ample pasturage for cattle—to the point where it became necessary for many distilleries to pay to have the slop removed.

Second factor was state sanitary laws, some prohibiting dumping of slop, some prohibiting its use for certain animal feeding. In some areas it was contemplated to load slop into barges and dump it at sea. Even this had cost disadvantages, inasmuch as it deprived producers of the recovery value in whole grain slops which was considerable because of high potential protein content.

Granular Flour

A much better solution was found in the development of granular flour. This ingenious plan contemplated the removal before fermentation of most of what would have become the distillery shop.

In normal flour milling, wheat grain is run through 11 stages of milling to attain final fineness. The idea was advanced to use one of the intermediate stages of flour as raw material for alcohol. The bran removed in milling was directly salable as cattle feed, contained some food materials otherwise lost in slop recovery, was not as perishable as dry distiller's grain. Since the bran was removed at the flour mill it did not have to be shipped to the distillery and thus freight costs were saved.

Experiments were made with both granular wheat flour and granular corn meal. It is understood that the corn meal has found some use as raw material for butyl alcohol. Increasing use is being found for granular wheat flour for ethanol.

Basic advantage of granular flour is the fact that pound for pound it contains more starch than does whole grain. Because corn was "short" the Department of Agriculture urged use of wheat. Alcohol distilleries reported that whole wheat could not be used "straight" without curtailing output of plant about 15 per cent because of difficulties in foaming, and slop disposal. Granular flour met both of these objections. Most of the material which becomes slop is removed *before* the grain leaves the flour mill.

Plans announced in December 1942 and sanctioned by the 1943 Agricultural Department Appropriations Bill provide 300,000,000 bushels of wheat in 1943 for alcohol from granular wheat flour. Conversion of molasses plants over to the new raw material has already been completed by E. I. du Pont de Nemours & Co. at Deepwater, N. J., and New England Alcohol Co. at Everett Mass., and are under way at other plants in this country and Canada.

> ***Lesson in Economics***
>
> *New England Alcohol Company's experience in converting a 10,000 gal. per day molasses alcohol plant over to operate on granular wheat flour as compared with whole wheat is both interesting and significant.*
>
> *Original plans, approved by WPB, called for conversion to wheat or corn at a cost of $250,000. Even this figure was predicated on the use of second hand and salvage equipment wherever possible. At the last minute, however, it was decided to go to granular wheat flour instead. The wheat flour plant is now in operation and total cost of the conversion was in the neighborhood of $35,000. Critical materials requiring priorities did not exceed $2,400 for the whole job.*
>
> *A description of how it was done, along with more details of the granular wheat flour process, will appear in Chemical Industries next month.—The Editors.*

Cooperative Research

The entire grain conversion program has been greatly aided by splendid cooperation of all parties concerned. The several cooperative agencies have included the engineers of WPB Chemical Division, Alcohols and Solvents Section, the Northern Regional Laboratories of the Department of Agriculture at Peoria, Illinois, the Commodity Credit Corporation, and the various technical staffs of the distilleries and alcohol plants, all of whom have contributed to the interchange of technical information.

Several cooperative research conferences have been held at Peoria, Louisville and Washington where technical men of the different companies have discussed comprehensive data, presented in standard form to permit double checking of results and save unnecessary duplication of work. These meetings have been educational, for it must be realized that the fermentation technique in connection with grain has been completely new to many plants and operating men whose entire experience has been in the field of molasses fermentation. A uniform test procedure has been agreed upon, based primarily on the handbooks of the American Association of Cereal Chemists and the Society of Official Agricultural Chemists.

Problems for the Future

(*1*) *An assured supply of raw material?*

Throughout the alcohol program there have been recurring vacillations as to proper source of material, as in the case of Senator Gillette's investigation to see why a larger portion of raw materials do not originate on the farm and more recently reported conservative officials who have privately expressed the feeling that by the end of 1943 the situation may be reversed and efforts made to prevent the further use of wheat in the manufacture of alcohol on the grounds that grain is needed as a food. There is now serious talk of grain shortage and rationing. A bumper 1943 wheat crop is hoped for.

(*2*) *Convoying of molasses?*

Molasses is being "ditched" in the Caribbean Islands. This represents an economic waste and is causing a serious sanitary problem. Temporary tanks of wood and asphalt were approved by WPB but shipping space wasn't allocated by WSA. The chances of getting this raw material to the U. S. in 1943-44 is a strong background factor.

(*3*) *At what price will alcohol be sold?*

Latest action of OPA on February 22 announcing new revision of MPR 28 reducing alcohol price schedule, based on SD2B 48 cents per gallon for fermentation ethyl alcohol, has introduced grave complications. The regulations stated are designed to bring most of the $250,000,000 ethyl alcohol industry under rigid control.

Only exceptions to the 48 cent price are in the case of beverage distilleries producing at a capacity of less than 15,000 gallons per day (and Pacific Coast producers who operate under separate schedule 295). This regulation became effective February 7, 1943, regardless of any contract agreement, lease or any other obligation. It may shut down a number of plants because of present material costs.

German Technical Propaganda Reveals "Flourishing European Chemical Industry"

This review of recent German technical press reports has been prepared by W. G. Cass of Heston, England. Stripping off the propaganda, Mr. Cass finds some interesting indications of the state of the industry in Axis occupied and neutral nations of continental Europe.

IN the German technical press recently attempts have been made to present a glowing picture of a flourishing European chemical industry, with a rapidly expanding productive capacity culminating eventually in complete independence and freedom from what is called the "Anglo-American yoke." By this presumably is meant that, under beneficent German control, including the technical skill and organization that this implies, the countries of Europe will be able to replace most of the foodstuffs and raw material of Anglo-American origin by synthetic materials, and the reign of Ersatz will be complete.

But these grandiose reports will not bear investigation on other grounds. In the first place Germany and of course the U.S.S.R. are excluded from survey, as also is Turkey, so that it is slightly misleading to speak of "European" chemical industry; and in the second place far more space is devoted to countries such as Spain and Sweden—not yet under German domination—than to those which are German-occupied. Very remarkably indeed it is shown by the German writers themselves that it is mainly in the former category of countries that any real progress, if any, has been achieved in certain branches of chemical industry; whilst in the occupied countries there is little or nothing to record. As a piece of propaganda, it is a complete failure and can hardly deceive even the Germans themselves. There is, however, a small amount of information of general interest.

Occupied Countries

In regard to Italy some imposing index figures are presented to show the rapid rise of her chemical production, but these relate to the years 1935-39; and of the actual war years little or nothing is said beyond some general claims in respect to the synthesis of ammonia, rubber, and liquid fuel. It is pointed out that, just before the outbreak of war, the Italian concern, Pirelli, in collaboration with the German I.G. had begun the manufacture of synthetic rubber, and two large organizations for the purpose had been established: (1) The National Research Institute for Synthetic Rubber, and (2) The Ital. Indust. Corporation for the Manufacture of Rubber, the latter having a capital of 60,000,000 lire.

In France also there is equally little to report. We learn that a large new company had been formed for the manufacture of synthetic fuel, known as the Cie. Centrale d'Hydrogenation et de Synthese, in Paris; financed ostensibly by the Banque de Paris, but actually no doubt by German industrialists who have long been in control of French finance. It is intended to produce liquid fuel by distillation of lignite, using the Fisher-Tropsch process, and the first factory is to be built at Fuveau-Becken, near Aix in Provence, where there are large deposits of lignite. But here again the project is very much of the future, for it will take at least three years to supply the necessary plant even for the first unit aiming at 25,000 tons gasoline and 25,000 tons methanol. Still more optimistic is the avowed intention "to double this output later."

Another comparatively new concern is the Soc. Languedoc. de Recherches des Exploitations Mineurs, with a capital of 125,000,000 frs., which apparently holds a license for working various mineral reserves in south-eastern France. The French Dunlop Co. is said to be making synthetic rubber, but, like the rest of France, is severely handicapped by lack of coal. High hopes were at one time placed on the inauguration of a comparatively new French chemical industry: the manufacture of calcium arsenate for plant sprays. But though the arsenate could be made, even to the extent of some 20,000 tons per year, the product was practically useless to the growers who could not obtain spraying equipment.

In Belgium, progress in chemical industry recently has mostly been on paper, or in the administrative sphere. That is to say, there has been much talk of reorganization, division of chemical industry into several principal groups, after the Italian style, and so on; but no solid achievement in the practical sphere. It is interesting to learn, however, that so far as Western Europe is concerned, the war is finished. One writer states that the production of a certain chemical had been seriously curtailed "after the end of the war in the west."

In Norway special attention is being directed to the manufacture of coaltar products, especially pyridine, hitherto imported. One of the new concerns is said to be the Nordiske Distillationsverk where phenol, pyridine, etc., and their derivatives are to be manufactured; also coal tar pitch. It is rather surprising to learn that, in recent years, there has been excess production of ammonia, for which no suitable outlets could be found, and that new uses are now being found. One would have supposed that ammonia would be about the last product to be in excess supply during war time. The principal chemical industries in Norway must of course center around cellulose products, and the synthetic production of fibers such as Zellwoll is being developed as much as possible. Carbon disulfide is another product which is becoming indigenous, to replace supplies no longer available from Germany. But in Norway, as in all other occupied countries, the difficulties due to shortage of labor, fuel, and raw materials, chaotic transport conditions, and more especially the growing dearth of technical and research workers, are becoming more and more insurmountable. So far from the chemical or indeed any other branch of industry flourishing, the precise opposite is the case, and many of them are ruined or are in rapid decline. It is only in the case of basic essentials, such as fertilizer, fuel, etc., no longer available from Germany, that desperate efforts are being made to build up some sort of temporary home industry.

Sweden and Spain

Conditions are no better in Hungary and southeastern Europe. The German writers themselves appear to turn with some relief to Sweden and Spain. In the former of these there is said to have been a large increase in the manufacture of sulfuric acid in recent years; and if this product is a measure of chemical progress as a whole—as has frequently been affirmed—then Sweden is undoubtedly progressive; but though nominally out of the war she must necessarily suffer very serious handicaps from thinly disguised German aggression and domination. Among other products of Swedish chemical industry which are either comparatively new in the industrial annals of that country, or are showing an upward trend in output, may be noted certain chlorine derivatives, such as chloramins, sodium sulfate, nitric and hydrochloric acids, and a synthetic rubber-like substance of the Neoprene type.

The chemical industries of Spain and recent progress are described at some length by the German writers, but much of the information they give is already known, as well as much more that they do not give. Outstanding achievements are (1) the remarkable increase in production of nitrogenous fertilizers, despite substantial imports of Chilean nitrate which have been maintained; (2) larger output of copper and sulfur or sulfuric acid from pyrites; and (3) increased manufacture of textile fibers from home grown straws and other indigenous sources.

Vinyl Resins in War and Peace—I

By Russell B. Akin

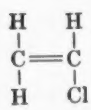
Plastics Department, E. I. du Pont de Nemours & Company, Inc.

Vinyl resins are playing an important role in war production, both as distinct materials in their own right and as rubber replacements. They are saving large quantities of natural rubber, and in some applications are producing results which will keep them in use long after natural and synthetic rubbers become freely available. Dr. Akin here reviews some of the war uses of the vinyls and provides a summary of chemical and physical properties which may suggest further applications for both war and peace.

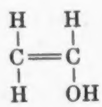
A GOOD indication of the importance of vinyl resins in the war effort is found in the fact that some of them were the first synthetic resins to be put under allocation (Order M-10, April, 1941). In October, 1942, all resins usually considered as vinyls were placed under the same allocation order, since the supply was insufficient for military needs.

Generally, vinyl polymers are thermoplastic and soluble in organic solvents. The exceptions are: (1) when the monomer has a second double bond, as in the case of butadiene. (2) when subjected to further reaction, as described under polyvinyl butyral (Part II); (3) when the polymer has a high number of hydroxyl groups, as in polyvinyl alcohol.

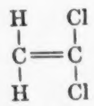
Commonly, the term "vinyl resins" is taken to mean polymers or copolymers of vinyl esters and ethers as typified by the following structures, or products derived by subsequent condensations based on such resins:



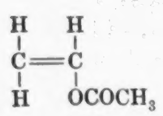
vinyl chloride



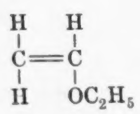
vinyl alcohol



vinylidene chloride



vinyl acetate



vinyl ethyl ether

The following chronology is of interest, as it demonstrates the accelerating pace of vinyl developments in recent years:

1838—Regnault[46] makes the first vinyl resin from vinyl chloride.

1912—Ostromisslenski[41] reports similarity of polyvinyl halides to halides of natural rubber degradation products.

1915—Griesheim Electron patents polyvinyl acetate as substitute for cellulose nitrate.

1928—First vinyl esters made in U. S. by Carbide & Carbon Chemicals Corp.

1929—Ostromisslenski secures patents on polyvinyl halides.

1929—Shawinigan Chemicals Ltd.[47] patents reaction products of aldehydes and polyvinyl acetate.

1932—Carbide & Carbon[19, 20] introduces copolymers of vinyl chloride and vinyl acetate.

1934—Skirrow and Morrison [47, 55] describe sequential formation of vinyl acetals.

1936—Carbide & Carbon[9, 43, 51] first describes polvinyl butyral for "hi-test" safety glass.

1936—Du Pont begins commercial evaluation of polyvinyl alcohol.

1938—Du Pont offers water dispersions of polyvinyl acetate.

1940—Dow introduces vinylidene chloride.

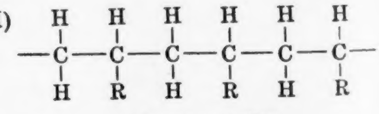
Building up of a vinyl polymer from the monomeric units is a highly exothermic reaction.* Catalysts for initiating this reaction are hydrogen peroxide or peroxides of organic acids, ultra-violet light, heat, boron trifluoride or aluminum chloride. Oxygen, atmospheric or dissolved in the monomer, plays an important part in polymerization. Minute, uncontrollable variations in this oxygen content influence the course and speed of ultra violet or thermal polymerization. Usual commercial practice is to employ benzoyl peroxide, thus assuring so large a peroxide concentration that peroxide from atmospheric oxygen contributes only negligible effects.

The vinyl monomer may be heated alone, with or without catalyst, to initiate reaction. Such polymerizations are so difficult to control, however, that reaction is usually carried out instead with good agitation in solvents or in media which produce an emulsion or granulation. Vinyl polymers retain solvents so well that polymerization in a solvent is usually employed only when a succeeding reaction will remove the solvent, or where a solution of the resin is desired, as for lacquers.

Polymerizing in water or salt solutions in the presence of emulsifiers is attractive because of the ease with which reaction heat may be dissipated, as well as the relative safety with which reaction mixtures may be brought up to reaction temperature. In the case of synthetic rubber manufacture, the final emulsion can resemble natural latex so much that the polymerization mixture may be used as in latex. If a smaller amount of dispersing agent is employed, a slurry of small solidified droplets may be secured, dried and used directly as a molding powder.

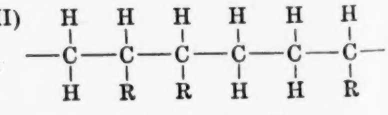
Several molecular structures for vinyl polymers can be proposed, where R stands for a chlorine atom in vinyl chloride, or acetate radical in vinyl acetate:

(I)



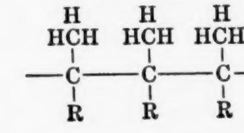
"head-to-tail"

(II)



"head-to-head"

(III)



* The course of polymerization has been studied by Staudinger and his students in a long series of papers, the work being reviewed by Staudinger,[58, 59] Mark,[35] and Marvel,[36] Whitby and Katz,[70] working on indenes, concluded that polymerization is a chain reaction since they isolated dimers and trimers enroute to higher polymers. Their findings were largely based on perseverance of olefin character in these very low polymers. Staudinger[60, 61, 62, 63, 64] maintained that, although polymers are formed by chain addition, the intermediate is not a true dimer or trimer. Rather it is, he said, an activated complex of several monomer units with the catalyst, or a monomer, one hydrogen of which, activated by ultra violet light, is bouncing along the carbon chain picking up other monomer molecules in the course of the trip, with no intermediate trimer ever existing. One basis for postulation of the activated grouping is the fact that a synthesized dimer or trimer of styrene has very little tendency to undergo polymerization. Starkweather and Taylor[57] in an early du Pont investigation of vinyl acetate also concluded that the reaction is one of an activated chain.

There may be, of course, random structures where there is no such regularity as in these pictures. Working on styrene, Staudinger[60-64] came to advocate the head-to-tail structure I. However, Midgley, Henne, and Leicester[39] by similar treatment got mixtures "which cast strong doubts on the significance of decomposition products in establishing the formula of polystyrene." Midgley[39] found some evidence for a small proportion of methyl groups such as would be present if structure III were a part of the polystyrene chain. There has been no report of methyl groups or tertiary butyl chloride derivatives in polyvinyl chloride. Presumably the more highly polar nature of other vinyl derivatives orients the heads of the monomer units enough to make them behave differently from styrene.

The work on structure of vinyl polymers has been almost purely of academic interest until recent widespread adoption of insolubilized polyvinyl alcohol derivatives for military coatings. This is discussed further under vinyl chloride and vinyl butyral.

Molecular weight, or chain length, of vinyl polymers is important, since it governs viscosity, solubility behavior, softening point and working properties. For those polymers whose chain is long enough to make them of industrial value, the molecular weight is so high that it cannot be determined by the usual measurements, as elevation of boiling point or depression of freezing point in solution, and special methods must be used.*

Polyvinyl Chloride

Vinyl chloride boils at -14°C. The monomer may be made from cracked petroleum gases:

$$H_2C{=}CH_2 \xrightarrow{Cl_2} \underset{\text{Cl}\ \ \text{Cl}}{H_2C{-}CH_2}$$

ethylene — symmetrical dichlorethane

$$\xrightarrow{NaOH} H_2C{=}CHCl$$

vinyl chloride

or from coal via calcium carbide:

$$HC{=}CH \xrightarrow[\text{aqueous}]{HCl} H_2C{=}CHCl$$

acetylene — vinyl chloride

Early work on vinyl chloride and vinyl bromide has been summarized by Morrell,[1] Staudinger,[59] and Marvel, Sample and Roy.[37] Staudinger[59] and Ostromisslenski[41] noted similarity of polyvinyl chlorides and bromides to products obtained by halogenation of rubber and assigned a head-to-tail structure. Marvel[37] confirmed this model by dehalogenating polyvinyl chloride by treating with zinc in dioxan solution.†

Vinyl chloride polymers are not so re-

* Staudinger determined molecular weights by viscosity measurements. His work has been summarized and criticized frequently,[5, 35, 36, 58] but remains the most satisfactory method for commercial measurements. Staudinger defines molecular weight of a polymer by this relation:

where

$$M = \frac{1}{Km} \times \frac{Nsp}{Cgm}$$

M = molecular weight
Km = constant for series of same polymer in same solvent
Nsp = specific viscosity = Nr-1
Nr = relative viscosity

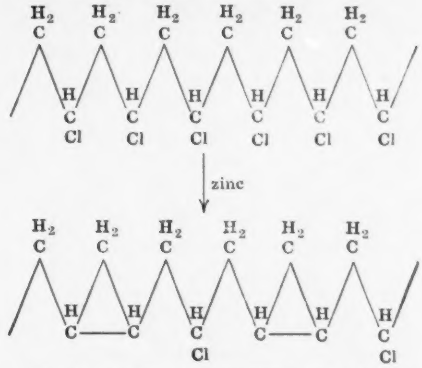
$$= \frac{\text{time of outflow of solution}}{\text{time of outflow of solvent}}$$

(as from Ostwald viscometer)
Cgm = concentration of monomer units in grammols per liter

The obvious difficulty here is that M is an average value for all the chains included in the sample, and there are few means for determining M so as to evaluate the constant Km for succeeding determinations.

Schulz and Dinglinger[48] fractionated polymers into narrow ranges and devised osmotic methods for determining the molecular weights. From these values Km can be calculated for use in the Staudinger equation, which is experimentally much more rapid and convenient than osmotic measurements.

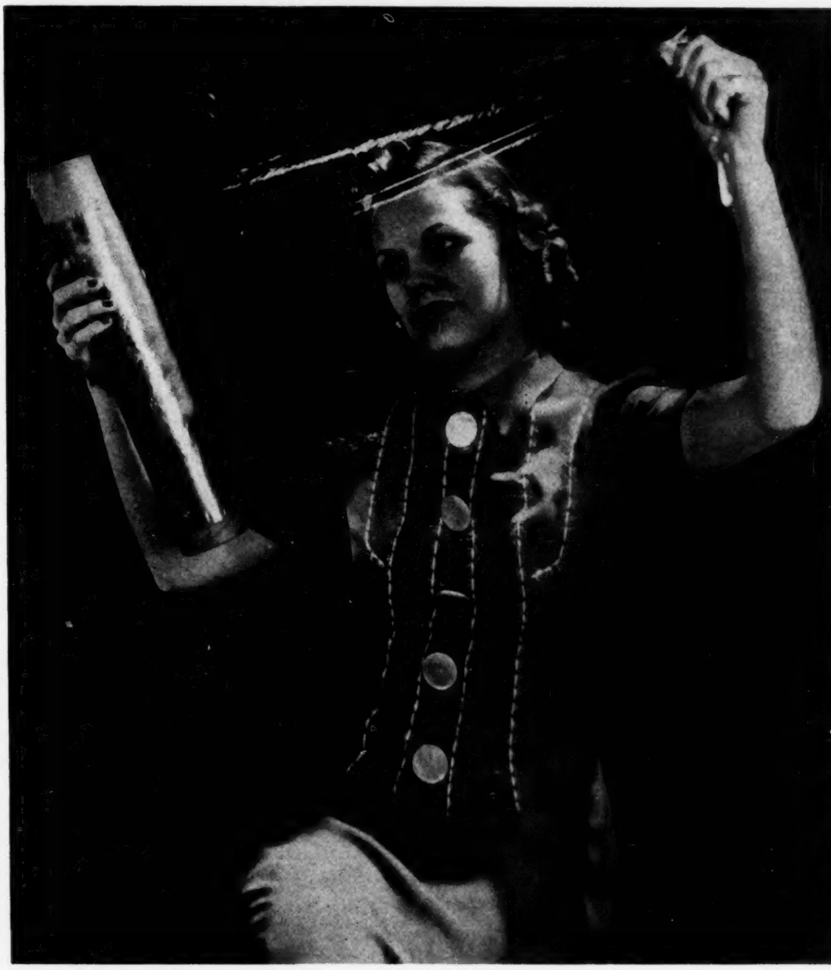
† Under these conditions 84 to 87% of the chlorine was removed. The remaining material was still soluble, indicating that chlorine had been removed without causing cross-linking. An occasional cyclopropane grouping was detected in the products of the zinc reaction:



Flory[24] calculated that 86.47% of the chlorine should theoretically be removed from a polyvinyl chloride having chlorine atoms in 1,3-positions (that is, on alternate carbons), if the removal followed statistical laws. Not all of the chlorines will be removed. If the first two and last two of five successive chlorines on alternate carbons are removed, then the third one is so far from another that a pair cannot be formed and this third atom cannot be dehalogenated by zinc. Similar calculations, also undertaken by Wall[69] and Simha,[53] showed that only 81.60% of the chlorine could be removed from a product having random grouping of 1,2- and 1,3-mixtures (mixtures of head-to-tail and head-to-head couplings), assuming that there would be no dehalogenation of a 1,4-grouping of substituents. Since the 81.60% removal was exceeded by Marvel, the vinyl chloride units must be coupled in head-to-tail fashion.

This dehalogenation study first appeared of only theoretical importance. The work, however, has demonstrated why a complete acetal cannot be prepared by reacting an aldehyde with polyvinyl alcohol, and shows the limit to which acetalization may be carried.

Transparent films which are odorless, waterproof and tasteless are readily made from polyvinyl chloride. Shown here is a film of Koroseal, a vinyl chloride.



sistant toward discoloration by sunlight as are vinyl or acrylic polymers. Marvel[36] pointed out that loss of hydrogen and chlorine from adjacent carbons caused by sunlight makes the next chlorine that of an allyl chloride. This will be even more likely to react again and will produce polyene chains which are highly colored. The progress can be arrested by stabilizers, such as amines.

$$-\underset{\displaystyle Cl}{\underset{|}{CH}}-CH_2-\underset{\displaystyle Cl}{\underset{|}{CH}}-CH_2-$$

$$\longrightarrow -CH{=}CH-\underset{\displaystyle Cl}{\underset{|}{CH}}-CH_2-$$

$$\longrightarrow -CH{=}CH-CH{=}CH-$$

Vinyl chloride is usually polymerized in an autoclave. However, patents have been issued on polymerization in solution, where pressure may not be required.

Because of brittleness and difficulty of cementing, the resin is rarely used in the unplasticized state. Plasticizers are tricresyl phosphate, dioctyl phthalate or high boiling aromatic ethers or ketones. For many purposes valuable modifications are obtained by copolymerization with a small amount of another material, as vinyl acetate[19, 20] or acrylic acid.[68] For purposes of comparison, chemical and physical properties of plasticized vinyl chloride are presented in Table I along with vinyl chloride-acetate copolymer. Properties of unmodified vinyl chloride are not given because of lack of commercial importance.

At room temperature, unplasticized polyvinyl chloride resists all concentrations of hydrochloric acid, 50% sulfuric acid, dilute nitric acid and 20% sodium hydroxide. Vinyl chloride valves are being used in German chemical plants[44] for carrying hydrochloric acid. Only fair strength is developed by welding, and the absence of good solvents makes it difficult to secure good cemented assemblies. Service temperatures above 40°C. are not recommended where pressure may exceed six atmospheres. In the United States, polyvinyl chloride coatings are used on chemical equipment, although vinyl acetate copolymers are used more in that work.

Alone, polyvinyl chloride softens above 85°C. Fibers of polyvinyl chloride are used for filter-cloths. Plasticized polyvinyl chloride gels are used instead of glues as matrices for molding plaster castings.[4] Because of non-flammability, negligible water absorption and excellent electrical properties, polyvinyl chloride is used for cable insulation.

Vinyl Acetate

Vinyl acetate is a mobile liquid boiling at 73° C. and freezing at -7°C., with specific gravity 0.934. The ester did not appear in the literature until 1912. It is soluble in water to the extent of 2.5%, and water is soluble in vinyl acetate to the extent of 0.1%. Although olefinic, it does not readily absorb halogens in the cold.

Resistoflex polyvinyl alcohol is used to replace rubber in these transmission rings which rotate against metal gears to supply power for various operations.

Chemische Fabrik Griesheim Elektron prepared acetic acid by passing acetylene into glacial acetic acid containing mercuric sulfate; vinyl acetate was recovered as a by-product. This preparation was patented in 1914.[12] The same company in 1915 patented polyvinyl acetate as a substitute for cellulose nitrate sheeting[13] and patented peroxide catalysts for the polymerization.[14]

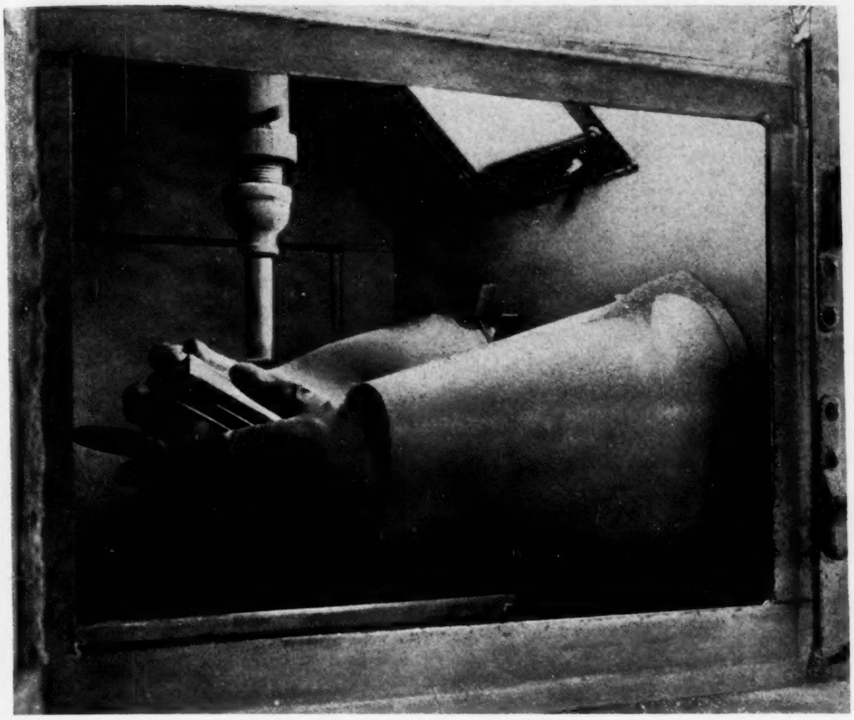
Consortium fur Elektrochemische Industrie also secured patents on this synthesis and polymerization.[16] Herrmann and Haehnel[29] first gave a good description of polyvinyl acetate. Staudinger, Frey and Stark[64] oxidized polyvinyl acetate with nitric acid and concluded the chain had vinyl acetate units arranged in head-to-tail fashion. Marvel and Denoon[38] proved the absence of any head-to-head coupling.

There has been no explanation of the findings that polyvinyl chloride and polyvinylidene chloride fibers have definite X-ray crystalline patterns, while polyvinyl acetate seems purely amorphous. Yet polyvinyl alcohol from the same polyvinyl acetate has a strong crystalline tendency.

Morrison and Shaw[40] in 1933 described the operating conditions which Shawinigan Chemicals of Canada found advisable for their large-scale preparation of vinyl acetate and ethylidene diacetate. Skirrow,[56] and Blaikie and Crozier[2] surveyed past literature and noted the high purity required in commercial vinyl acetate monomer: the vinyl acetate content should be 99.9% by weight, the small amount of acetic acid present retarding hydrolysis of the ester and attendant formation of acetaldehyde. For the same amount of benzoyl peroxide, viscosities of 20, 15 and 6 centipoises, respectively, are obtained from monomer containing 0.1, 0.2, and 0.6% acetaldehyde.

First efforts to polymerize vinyl acetate in presence of acetaldehyde gave soft materials which were called "estergums" and the true identity of which was apparently not recognized.[6,47]

Vinyl acetate may be polymerized in benzene, and sold as solution, or dried and sold essentially solvent-free. Complete removal of solvent is difficult, especially from products of high molecular weight. Large quantities are prepared in aqueous emulsion of 55% solids content for use as an extender or replacement for rubber latex, adhesives with attractive heat-sealing properties, and as binders for paper, leather scrap, ceramic mixes, etc. These emulsions are also used in the shoe and plywood industries,[7] and impart some water resistance when mixed with casein or dextrin glues. Experiments with the emulsion as an adhesive are reported by Halls.[28] Paper-coatings and impregnated papers of high wet strength, textile and felt sizings are based on this emulsion. Chewing gum has been made from low viscosity polyvinyl acetate. Large quantities are converted into polyvinyl alcohol



Good resistance to abrasion and wear has made these sheet Resistoflex polyvinyl alcohol sandblast wrist shields far outlast their natural rubber predecessors.

and polyvinyl acetals. Vinyl acetate polymer is soluble in methanol, ethanol (95%), ethyl acetate, acetone, acetic acid, certain chlorinated solvents, nitrobenzene, aniline, dioxane, etc. It is insoluble in, but swelled by, butyl alcohol, ethyl ether or warm water; but it is insoluble in and not swelled by aliphatic hydrocarbons, hexanol, turpentine, linseed oil, glycols or glycerine.

Extensive physical data on polyvinyl acetate are not available because of the large number of different polymers and the fact that polyvinyl acetate is usually compounded with plasticizers or employed purely as an adhesive rather than as a structural plastic. This is due to its low softening temperature. Acids and alkalis hydrolyze polyvinyl acetate somewhat. Coatings are usually compounded with additional resins, while relying on polyvinyl acetate for bonding strength. Numerous patents have been issued in this field.

Using benzoyl peroxide, vinyl acetate is copolymerized with blown oils to give "Olovines" used as drying oils in varnishes.[17]

Vinyl Chloride-Vinyl Acetate Copolymers

As previously mentioned, copolymerization is often resorted to for enhancing the working properties of vinyl chloride. When two vinyl derivatives are mixed and subjected to polymerizing influences, the polymer may have a carbon chain made up from both monomers.

Marvel[36] has said, "The technical development in this field is far ahead of the scientific literature. Not every pair of vinyl monomers can be converted into a copolymer, and there are some monomeric ethylenic derivatives which will enter into copolymers but will not themselves polymerize. It is interesting that vinyl acetate alone polymerizes more rapidly than vinyl chloride alone; however, when the two monomers are mixed and polymerized, the polymer first formed is richer in vinyl chloride than the mixture from which it is formed." Staudinger and Schneiders[66] studied this phenomenon and reviewed earlier work.

As stated under vinyl chloride, copolymers with vinyl acetate are usually employed for plastic moldings and sheeting, and for solution coatings. Physical constants of typical compositions are given in Table I.

The vinyl copolymers were introduced in 1933 by Carbide and Carbon Chemicals Corp.[19, 20] Their low moisture absorption renders them more stable dimensionally than cellulose nitrate or cellulose acetate. Copolymer sheets are used for aircraft enclosures, drafting and navigating instruments, sound recordings, and surface coatings. Chemical resistance has brought them into use as storage battery separators, gaskets, and linings for beer cans and chemical tanks.

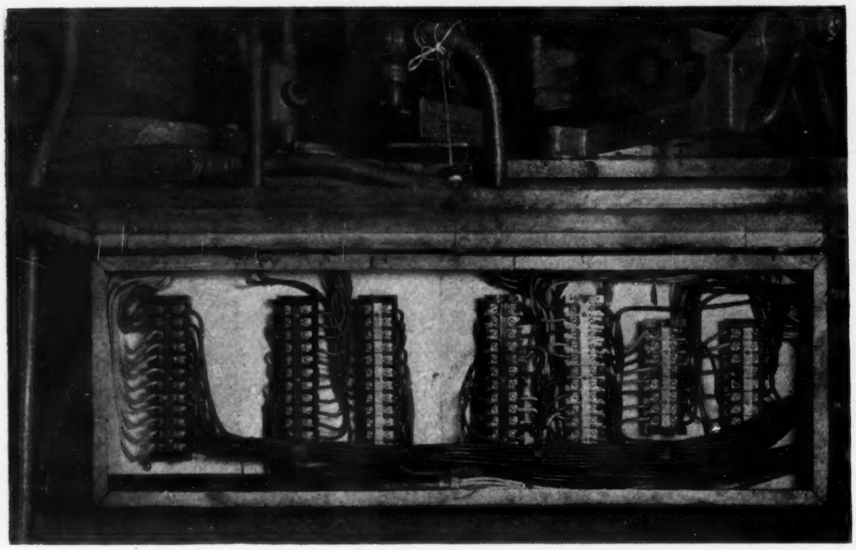
Good electrical characteristics and failure to support combustion, coupled with toughness and low moisture absorption, make insulation of cables the biggest single use of these copolymers today. The speedy crippling of the Graf Spee is attributed to destruction of her control system by fire which travelled along rubber insulated cables. Copolymer-covered cables can even be buried underground without need for external metal conduit. Because of the higher insulation resistance, twice as much copper, and hence more current capacity, can be put into conduits of the same diameter.

Unplasticized copolymer is spun into yarn which has high refractive index, hence exhibits colors well for novelty weaves. Chemical resistance of the copolymer yarns is good enough for their use in filter cloth, but softening temperature is comparatively low. Highly plasticized copolymer has excellent abrasion resistance,[22] and sheeting is used for Navy binocular covers, toe caps and soles for children's shoes.

Belts and suspenders have been made of plasticized copolymer. Shower curtains, which are light colored and proof against

Table I—Physical Properties of Typical Compositions of Vinyl Chloride and Chloride-Acetate Polymers

	Rigid Vinyl Chloride-Acetate	Plasticized Chloride-Acetate	Plasticized Vinyl Chloride
Molding qualities	excellent	good	good
Compression molding, °F.	280-325	250-340	290-350
Injection molding, °F.	280-300	250-340	300-350
Specific gravity	1.34-1.37	1.2-1.6	1.2-1.6
Tensile strength, lbs. per sq. inch	8,000-10,000	1,000-9,000	1,000-9,000
% Elongation	—	to 500%	to 500%
Softening temperature, °F.	140	—	—
Volume resistivity	10^{15} ohm-cm	—	10^{15} ohm-cm
Dielectric strength	650	300	600
Dielectric constant			
60 cycles	3.26	9.0	6.5
million cycles	3.08	4.2	—
Power factor			
60 cycles	0.008	0.08	0.08
million cycles	0.017	0.10	—
Water absorption			
24 hours	0.05-.15	—	0.05-0.6
Effect of age	none	may harden by vaporization of plasticizer	
Sunlight	darkens slightly	darkens	darkens
Resistance to.			
weak acids	excellent	good	good
strong acids	excellent	very good	very good
weak alkalies	excellent	very good	very good
strong alkalies	very good	very good	very good
alcohols	excellent	very good	very good
ketones	dissolves	dissolves	dissolves
esters	dissolves	dissolves	dissolves
aromatic hydrocarbons	swells	swells	swells
mineral oils	excellent	excellent	excellent
vegetable oils	excellent	excellent	excellent

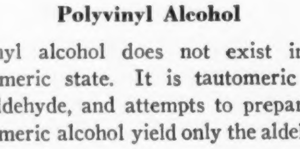


Automatic drill press is coated with Flamenol polyvinyl chloride.

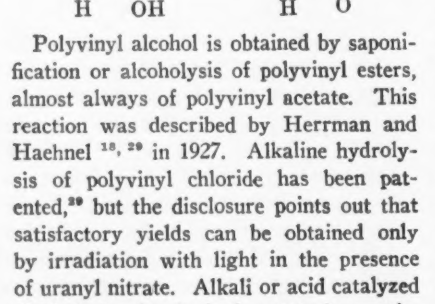
stains, were made from fabric coated with plasticized copolymer. Now waterproofing of fabrics for raincoats, paulins, sleeping bags etc., take about all of the material which is left beyond the needs for cable insulation.

Polyvinyl Alcohol

Vinyl alcohol does not exist in the monomeric state. It is tautomeric with acetaldehyde, and attempts to prepare the monomeric alcohol yield only the aldehyde:



Polyvinyl alcohol is obtained by saponification or alcoholysis of polyvinyl esters, almost always of polyvinyl acetate. This reaction was described by Herrman and Haehnel [18, 29] in 1927. Alkaline hydrolysis of polyvinyl chloride has been patented,[29] but the disclosure points out that satisfactory yields can be obtained only by irradiation with light in the presence of uranyl nitrate. Alkali or acid catalyzed alcoholysis of polyvinyl acetate is a satisfactory reaction for making polyvinyl alcohol since the by-product is usable ethyl acetate or similar solvent.



Since polyvinyl alcohol is obtained by saponification of polyvinyl acetate, the structure may be derived as follows: If saponification is about half completed, the resulting product is soluble in mixtures of alcohols and water. If hydrolysis exceeds 80% of completion, the material is readily soluble in water alone. Aqueous solutions of the latter product can easily be prepared which contain 20% solids by weight.

Polyvinyl alcohol can be plasticized with glycols, glycerol or formamide derivatives. Sheeting prepared from plasticized polyvinyl alcohol resembles that from polyvinyl chloride in appearance and resilience.

The solubility of polyvinyl alcohol in water has led to the use of polyvinyl alcohol solutions in textile sizing, with many advantages over starch glue and other commonly used materials. Partially saponified polyvinyl alcohols are of considerable industrial interest. Polyvinyl alcohol may be formulated into adhesives, the most interesting of which are the remoistenable types. It can be used to increase the wet-strength of paper. Polyvinyl alcohol is a very effective emulsifier; this property may be varied greatly by degree of hydrolysis from polyvinyl ester or by subsequent condensation with aldehydes to form acetals. From water, polyvinyl alcohol gives clear tough films.

Polyvinyl alcohol film is extremely impermeable to gases other than water vapor. For this reason, it is employed as a basis for paint used in sealing wood, paper, and metal joints against passage of fumigants such as methyl bromide or methyl formate. Films are impervious to greases, oils and most organic solvents, and offer corrosion protection not possible with other wrapping foils.

Molded articles with rubber-like properties may be made from modified polyvinyl alcohol. Extruded polyvinyl alcohol tubing has unusual resistance to aromatic fuels and chlorinated solvents. The resistance of polyvinyl alcohol to water may be increased by treatment with chromium salts or thermosetting resins such as dimethylol urea,[76] although much of this work is still in the development stage. Gaskets made from polyvinyl alcohol sheeting are more resistant to cold-flow or creep under pressure than other thermoplastic vinyls of the same flexibility. Another important use of polyvinyl alcohol is for subsequent condensation with aldehydes to yield polyvinyl acetals.

Editor's Note: Part II of this article, covering polyvinyl acetals and vinylidene chloride, will appear next month.

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BETWEEN THE LINES

Wood Waste May Have Chemical Future

Not only ethyl alcohol, but methyl alcohol, phenols, plastics and other lignin products, many yet undiscovered, await whoever develops an economic process for hydrolysis of wood waste. American process, though less efficient than Scholler for wood sugar for alcohol, shows greatest overall promise according to work by U. S. Forest Service.

REFERENCE was made here last month to the possibility of supplementing the nation's ethyl alcohol supply for munitions, and perhaps rubber and other products, from wood sugar obtained by hydrolysis of the cellulose in waste sulfite liquor. Projected experiments in this country which have since been announced from Washington give emphasis to the so-called Scholler process of hydrolysis, which according to information received (see item on next page) has a decided advantage in yield over the American process.

Meanwhile, however, experiments by the Forest Service of the U. S. Department of Agriculture put a different and perhaps more promising light on the older and, until now, discarded American process. It is too early in its development to speculate about this latest aspect of wood hydrolysis, but it could well be that the American process will mean more to industry in the long run than is indicated by its relationship to alcohol production alone.

The future of alcohol industrially is bound up in post-war uncertainties. There will most likely be an ample supply for all purposes, although it is not impossible that new demands may require additional resources. There is, however, another important potentiality of the American process of sulfite liquor and waste wood conversion about which there is little question of greatly increased postwar demand. That potentiality is plastics.

Forest Products Laboratory has asserted that from hardwood using hydrolysis under pressure with dilute sulfuric acid, "highly satisfactory and cheap" plastic materials can be produced. One process puts sawdust into a closed container where it is treated with steam at about 150 pounds pressure, while ½ per cent sulfuric acid solution is added. After 20 or 30 minutes the resulting mass is washed. The solid residue, representing about 1400 pounds of an original ton, is dried. Small quantities of furfural, aniline, and stearic acid are added, and then 10 to 15 per cent of ordinary bakelite phenol formaldehyde resin. This decreases the flow-time. The material is formed under heat and pressure, and the resulting product is claimed to be very nearly fireproof.

Another material is made of laminated paper impregnated with phenol formaldehyde resin and pressed under heat. A somewhat similar composition is made from hydrolyzed wood itself, which at the Forest Products laboratory is now being sheeted as a paper, pressed together and plasticized.

According to the report on this work, these materials approach mild steel in strength, with a strength-to-weight ratio that exceeds the lighter magnesium alloys. They are regarded as having unquestioned utility in both normal industry and current war materials production. They are not plywoods, but have similar uses, it is pointed out. Moreover, they are definitely stronger than plywood and may, for this and other reasons, eventually be preferred for some purposes to plywood.

The materials are very water resistant, and the suggestion has been made that they might be used for some types of containers. However no such production has been attempted at this stage.

Economics of American Process

Such discoveries cast us back to the initial proposal to make alcohol. The advantage claimed for the Scholler method is that it wastes less material, therefore costs less to operate, although it is generally conceded that alcohol made by either method must have some compensating factor in production to make it competitive with the older procedures.

In this respect it is evident from these reports on the American process that alcohol might easily become a by-product of plants making a much more valuable commodity. If a plant could be operated for wood hydrolysis, making plastic materials primarily, the principal objection to the American process for alcohol from wood—high production cost—would be largely overcome. The necessity of having large supplies of wood waste, such as only a relatively few mills provide today, would not bulk so importantly in the plan.

Lignin is an important component of the waste from both the American and the Scholler processes. In the American practice, the 1400 pounds (approximately) of residue per ton contains all the lignin of the wood, and the partially converted cellulose and hemicellulosic substances. This compares with the known 500 to 600 pounds of pure lignin derived from the Scholler method.

The value of lignin is still subject to new experiments, but much already has been developed in studies by the abovementioned laboratory and others. The Forest Products investigation shows that a ton of lignin furnishes the following: 15 gallons of methyl alcohol, 300 pounds of mixed phenols, 80 pounds of neutral oil, and 300 pounds of heavy oil. These oils in turn, it is believed, will yield other useful materials. European research is said to have shown marked possibilities of obtaining various chemicals through dry distillation of lignin. Corresponding research is lacking in the United States, but enough is known to indicate the potentialities of sulfate and sulfite lignins. Vanillin, active ingredient of artificial vanilla flavorings, has been developed on a commercial scale here from lignin.

Lignin for Plastics

According to a current report on the subject, sulfite lignin is already being utilized in this country on a small scale for plastics, and hydrogenation is stated also to have promise. Thus, it has been pointed out that wood can be utilized as a source of chemicals during the war period, apart from its value for alcohol production.

In all the discussions that have been reported recently on wood hydrolysis there runs a thread of comment that this or that discovery has been carried into practical utilization abroad but has not been closely followed in the United States. The United States, always prodigal with its resources, has burned its sawdust piles or left them to rot when the mills moved on. Slabs, ends, bark, and other such material, chips, and the waste from pulp manufacture, have been treated as so much rubbish. In other times this was not so serious in its consequences. Now, with all categories of raw materials in urgent demand, this country may rapidly find itself seeking to follow the examples that have been reported from abroad.

Germany, it is known, is using sawdust and other sawmill waste to evolve commercially usable substitutes for coal-tar

dyes, of which the Germans are short. The process is to treat the sawdust with sulfur and caustic soda in a furnace. Sulfuretted hydrogen, thus released, is dissolved in water, and the solution is available as a dye. Fixed by passing through boiling potassium chromate, the resulting colors resemble coal-tar dyes.

Sweden is pushing research in the possibilities of wood for various chemical raw materials, according to other reports. That country has, as an indication, increased its sulfuric acid production, and it is significant that new industries have been reported using this material. Among these are said to be plants for production of sugar from wood and for cellulose wood manufacture.

The potentialities of wood as a chemical raw material are great, and it is not inconceivable that the development of wood hydrolysis in this country may yet be one of the significant industrial chemical outgrowths of the war. The mixed phenols derived from lignin, already mentioned, are needed to make synthetic resins, explosives, pharmaceuticals, and a score of other essential wartime chemical products. Methyl alcohol is a source of formaldehyde for phenol-formaldehyde resins. As to the oils, the government's scientists state frankly that they have not even tried to break them down, but they do know that they may hold a good many substances of value. perhaps even of vital use.

Wood Hydrolysis Pilot Plants Authorized

IN line with recommendations of Dr. J. Alfred Hall to the Chemicals Division, the War Production Board has authorized extensive pilot plant experiments in alcohol production by wood hydrolysis. These experiments are intended to provide the basic engineering knowledge for construction of a full-scale wood-waste utilization plant, using the Scholler process.

The pilot plants will operate in Michigan and Tennessee, under ownership of American companies, but with the supervision and aid of the Forest Products Laboratory of the Department of Agriculture, and with some funds from this service. Both of these American companies had Scholler licenses before the war, and German patents are on file also with the Alien Property Custodian. In addition to the technical knowledge thus implied on the part of American concerns, there is in the United States now, among German refugees, the former president of the Scholler-Ternesch Company, E. M. Schaefer. He is expected to furnish valuable additional information on this process.

Under normal conditions the availability of other materials, such as grain and blackstrap molasses, for making alcohol in this country has detracted from the basic importance of such materials as wood. However, as Dr. Hall pointed out to members of Congress recently, "We ought to have one plant going on a commercial scale, so that a full background of chemical engineering and technical experience can be built up."

Decision to use stockpiled grain for alcohol production has caused attention to be focused currently on other processes, such as Scholler, as a possible insurance against too great a drain on food grains, if alcohol should be needed in greater quantities than now contemplated.

The American process is designed to produce about 20 to 22 gal. of alcohol per ton of wood, the remainder of the material then being thrown away or burned. This was an inherent fault even years ago, and compares unfavorably with the Scholler production reported recently from Germany of 50 gal. or better per ton. To obtain enough sawdust to support a 1,000,000 gal. per year hydrolysis plant using the American method, it was brought out, would require a mill cutting 150,000,000 feet of lumber annually. Only nine mills of this size are still operating, and these are all in the West, according to a recent canvass of the situation.

Using the Scholler process, with its higher ratio of alcohol per ton, it is estimated there are 73 mills in the country capable of supporting alcohol producing plants. Theoretically, it works out that these mills could furnish material for 500,000,000 gallons of alcohol annually, using Scholler technique, and 120,000,000 by the American method.

Any private concern having a legitimate interest in the development of the Scholler process, it has been stated at WPB, will be given access to information on all stages of progress of the experiments so that such plant may be in a position to offer to engineer and operate a commercial plant if ever construction appears justified.

It has been claimed that alcohol made from wood and sulfite liquor is exceptionally pure, and can be made whatever proof desired.

Washington Notes

Artificial Shortage: First quarter contract demands, as well as requirements of non-contract alcohol producers using corn, have about used up the government held reserve stocks which are considered to be available. The remainder of these supplies will be held off the market, according to present plan. This means that new supplies may have to come from open market stocks. There is plenty of corn in the country, but it is reportedly being held off the market because of the expectation that a higher-than-current-ceiling price may be obtained later. The opposition in the Administration as well as elsewhere to pending legislation such as the Pace bill, which would assure such prices, makes it evident that such hopes for higher corn prices may be only passing, but meanwhile corn supplies are short.

Containers: Formation of a Paperboard Container Allocation Advisory Committee has been completed, with Thomas E. Morriss as the government representative.

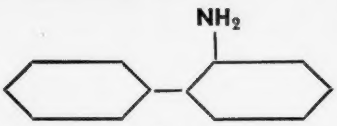
Fats and Oils: Transfer of jurisdiction from WPB to the Department of Agriculture has been announced for the following fats and oils: cacahuanche, laceta, palm, tung, oiticica, mustard seed, sperm, cashew nut shell, castor, and glycerine made from fats and oils.

WPB to FDO: Incidental to transfer of various commodities from WPB to the Department of Agriculture, including fats and oils mentioned above, the following changes of WPB orders to Food Distribution orders have been made: WPB M-58 to FDO-34, WPB M-66 to FDO-36, WPB M-235 to FDO-32, WPB M-57 to FDO 39, WPB M-40 to FDO-37, WPB M-59 to FDO-38, WPB M-77 to FDO-35, WPB M-193 to FDO-33.

Exports: Cancellations of General Licenses by BEW for the exportation of certain commodities do not apply to shipments of the commodities for which ODT permits are still valid for delivery if such ODT permits were issued prior to the effective dates of such cancellations. This exception applies to such cancellations as they have been previously announced. Individual licenses are not required for exportations under this exception.

Trucks: J. N. Hall, chief of the Transportation Unit of the Chemicals Division of WPB, has advised all companies requiring trucks during 1943 to place orders immediately so the Allocation Committee will have available a complete record of essential requirements.

New Product Report



O-AMINODIPHENYL

(TECHNICAL)

A useful, low-priced intermediate

INTERESTING CHARACTERISTICS:

To many manufacturers, O-Aminodiphenyl, technical, offers possible relief from a shortage of aniline oil. It may also be used in resin compositions, in the manufacture of quinoline yellow type dyestuffs and as a plasticizer.

AVAILABILITY:

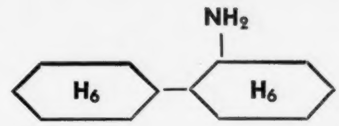
Now in commercial production and plentiful quantities are available at low prices.

SUGGESTED USES:

1. In resin compositions. **2.** In dyestuff synthesis to produce dyestuffs of quinoline yellow series characterized by their fastness and a shade of yellow having a green tone. (U. S. Patent 2,211,662, assigned to Monsanto.) **3.** As a plasticizer. **4.** As a replacement for aniline.

PHYSICAL PROPERTIES:

Appearance: purplish crystalline mass.
Molecular Weight: 169.1
Crystallizing point: 47.0°C. min.
Distillation range: 295.0°C. min. to 310.0°C. max.
Solubility: Only slightly soluble in water. Soluble in alcohols, esters, ketones, benzene, chlorinated aliphatic and aromatic solvents, pine oil, turpentine, vegetable oils, and to a limited extent in mineral spirits.



O-AMINODICYCLOHEXYL

A strong, primary amine

INTERESTING CHARACTERISTICS:

O-Aminodicyclohexyl promises to be of particular value in reactions where an essentially water-insoluble, strong, primary amine is required.

AVAILABILITY:

Now available only in experimental quantities.

SUGGESTED USES:

1. As an intermediate in chemical synthesis. **2.** In reactions where an essentially water-insoluble, strong, primary amine is required.

PHYSICAL PROPERTIES:

Molecular Weight: 181.19
Appearance: colorless liquid.
Specific gravity: 0.936 at 25°/25°C.
Refractive index: 1.493 at 25°C.
Boiling point: 262.5°C.
Solubility: Only slightly soluble in water. Miscible with alcohols, esters, ketones, benzene, chlorinated aliphatic and aromatic solvents, pine oil, turpentine, vegetable oils, and mineral spirits.

"E" FOR EXCELLENCE—The Army-Navy "E" burgee with two stars, "representing recognition by the Army and the Navy of especially meritorious production of war materials" over a two-year period flies over Monsanto.

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Organic Chemicals Division, 1706 S. 2nd St., St. Louis, Mo.

Please send me experimental quantities of
☐ O-Aminodiphenyl ☐ O-Aminodicyclohexyl

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Firm ____________________

Address ____________ *City* ____________

Headliners in the News

Prize Winners . . . Two scientists were honored at the 105th meeting of the American Chemical Society in Detroit recently. The Borden Company prize of $1,000 for research in the chemistry of milk went to Dr. Earle C. Whittier, at the left, senior chemist of the Research Laboratories of the Bureau of Dairy Chemistry, U. S. Department of Agriculture. Dr. Herbert E. Carter of the University of Illinois, at the right, received the $1,000 Eli Lilly and Company prize in biological chemistry for his contributions to knowledge of the amino acids.

Honored by Columbia . . . The Charles Frederick Chandler Medal of Columbia University has been awarded to Willard H. Dow of Midland, Mich., president of the Dow Chemical Company.

Advanced by Hercules . . . The board of directors of Hercules Powder Company has elected Edward B. Morrow, left, a vice-president, and named Francis J. Kennerley, right, to succeed Mr. Morrow as treasurer of the company. Mr. Morrow, who has served for two years as treasurer, became associated with Hercules in 1916 in the Explosives Sales department. Mr. Kennerley has been with the company for all of its 31 years in the chemical business.

Science Scholarships . . . Vice President Wallace congratulates Ray Reinhart Schiff, 16, of New Rochelle, N. Y., and Gloria Indus Lauer, 17, Ames, Ia., on receiving the top awards in the second nation-wide Science Talent Search. Each received a four-year Westinghouse Science Grand Scholarship of $2,400. The Science Talent Search, conducted among the nation's million high school graduating seniors, is sponsored by the Science Clubs of America and the Westinghouse Electric and Manufacturing Company.

TRIMETHYLAMINE

Low Priced ✓
Now Available ✓

Present availability and low cost of this amine recommend its consideration for applications where the characteristic odor is not objectionable. For convenience in handling and storage, Trimethylamine is sold as a 25% water solution from which the gas is easily liberated by application of heat. Purity—not less than 98 mol % of the total amines in solution . . . formaldehyde not over 0.3% and ammonia not over 0.2% of the weight of the solution.

$(CH_3)_3N$

Properties of pure **TRIMETHYLAMINE**

Molecular weight 59.11
Specific gravity ...... 0.662 at −5°C
Boiling point .... 3.5°C (approx.)
Melting point .... −124°C
Elec. conductivity ..... 2.2×10^{-10} reciprocal ohms at −33.5°C
Solubility in water ...... Very soluble
Odor .... Pungent, ammoniacal
Color .... Colorless

PROPERTIES

Trimethylamine is an easily condensable, readily flammable gas with a pungent ammoniacal odor. It is very soluble in water, one liter of an aqueous saturated solution at 19° C containing 410 grams of Trimethylamine. It reacts readily with either organic or mineral acids.

APPLICATIONS

Technical and patent literature describe numerous uses for Trimethylamine. It is an effective warning agent in bottled gases. It is an insect attractant. Methyl chloride can be readily produced from Trimethylamine, and important derivatives are formed by reactions with halogens or ethylene chlorhydrin. Trimethylamine offers many additional possibilities in synthesis. A sample will gladly be sent on request.

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N. Y. Section, A. C. S. — April Meeting

The topic of the April 2 meeting, presided over by Dr. Charles N. Frey, chairman, was statistics. Dr. Beverly L. Clarke of the Bell Telephone Laboratories, Inc., below, right, addressed the group on "Some Practical Applications of Statistics to Analytical Chemistry." Rev. Francis W. Power, S.J., Fordham University, shown below with Dr. Cornelia T. Snell, secretary of the section, spoke on "Statistics in Vitro and in Vivo."

Discussion on the addresses was led by W. A. Shewhart, at the right, of Bell Telephone Laboratories, Inc.

N. J. Section, A. C. S. — April Meeting

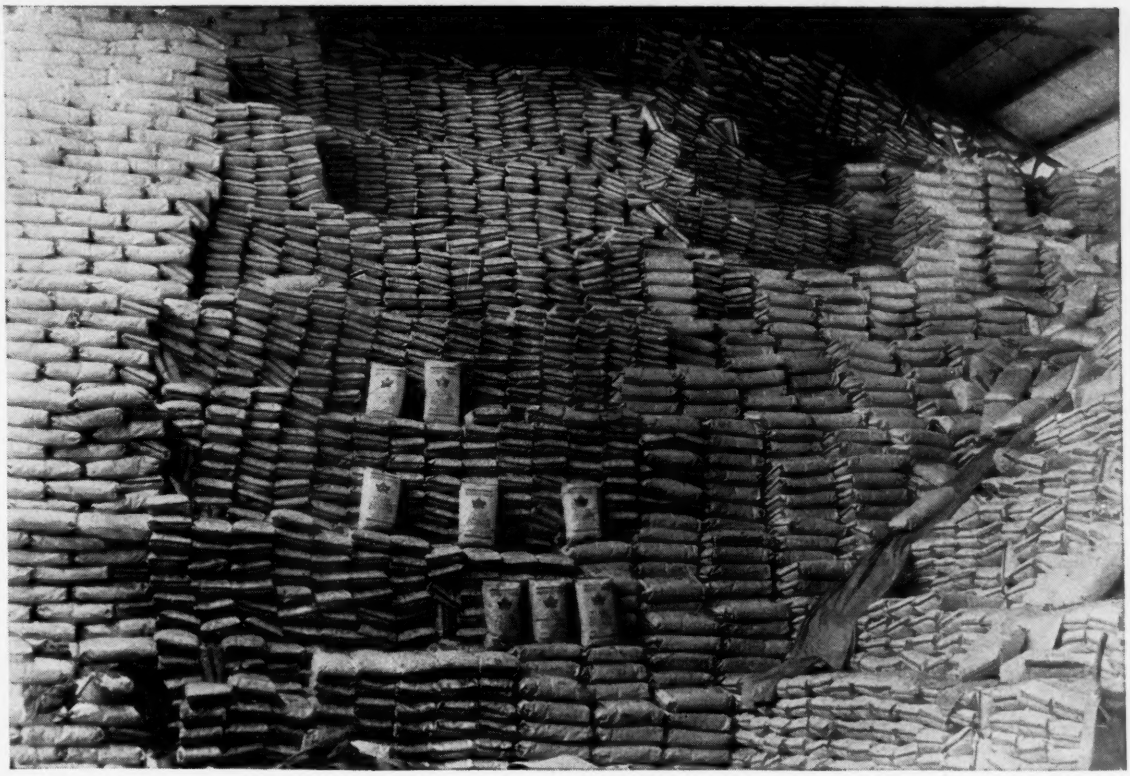
The North Jersey Section of the A.C.S. held its monthly meeting in Elizabeth, N. J., on April 5, 1943. Chairman C. S. Fuller presided.

Prof. Clifford B. Purves of Massachusetts Institute of Technology, at the left, addressed the meeting on "Distribution of Unsubstituted Hydroxyl Groups in Some Technical Cellulose Acetates and Ethers."

After the main lecture, the separate group meetings were held.

The Organic and Biological group was addressed by Dr. Frank R. Mayo of U. S. Rubber Co., at the far left, below, on "Addition of Halogen Acids to Ethylene Derivatives."

The Physical and Inorganic group heard a discussion by Dr. Paul J. Flory of the Standard Oil Development Co., at the left, on "High Polymer Solutions—Their Properties from a Thermodynamic Point of View."



A mountain of calcium chloride in St. Regis Paper Bags

100 lb. bags of calcium chloride stacked fifty high, to the rafters... bags on the floor withstanding 2½ tons pressure... bags on upper tiers taking the bumps on the 40 ft. slide down for shipment.

This photograph speaks volumes for the ruggedness and toughness of St. Regis Multiwall Bags. It explains why breakage, siftage and transit losses are greatly minimized. This is due to Multiwall construction; i.e., several plies of kraft paper in tube form, with each bearing its share of the burden. The bags shown have, in addition, a special moisture resistant sheet which prevents hygroscopic and deliquescent $CaCl_2$ from caking or going into solution during a long storage period.

Not only does St. Regis offer you Multiwall Paper Bags *custom*-built to fit your specific needs but also the *specialized service* of St. Regis engineers, plus the benefit of our long years of experience in manufacturing and installing bag filling and closing equipment. Let us study your packing operation and recommend the type of bag to protect your product and to meet your production needs.

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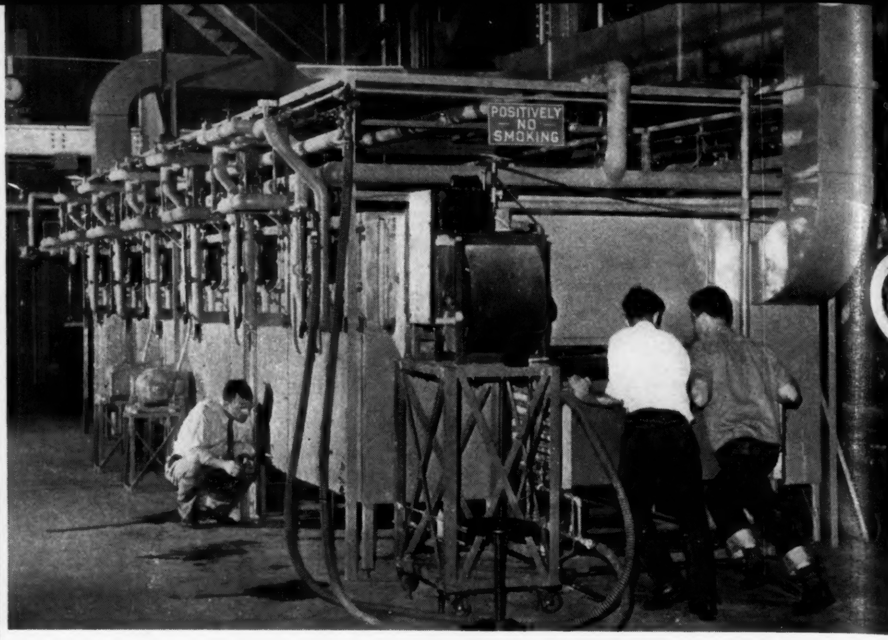

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Food Dehydration Progresses

The dual problem of dehydrating thousands of tons of fruits, vegetables, meats, eggs and milk and sending them to the armed forces overseas is being subjected to intensive study by scientists and technologists.

Most of the work is being done with the dehydration of vegetables, while the dehydration of milk and eggs has been pretty well worked out. Least knowledge exists as to the dehydration of meat.

Several different types of equipment are being used. The tunnel type of dehydrator is designed for continuous operation. With the cabinet type it is possible to make two runs a day for many products. The spray and drum types give products that are powdery or flaky. Vacuum dehydrators may operate continuously or in batches.

Among the newer and more nearly unique types of dehydrators is one designed to convert food products to powder from liquid or liquid-suspended form. The equipment consists essentially of sanitary pumps, a centrifugal concentrator, a combined centrifugal drying chamber and powder collector, and equipment to supply and heat the air for dehydration.

The pictures on this page, taken by the U. S. Department of Agriculture and supplied to us through the Courtesy of the Compressed Air Institute, give an idea of the work being done on an important phase of winning the war on the food front.

(1) Semi-commercial dehydration plant at the Western Regional Research Laboratory, United States Department of Agriculture. A truckload of trays filled with properly prepared cabbage is run into a tunnel dryer.

(2) Cabinet dryer trays of beef that has been dehydrated and partially dried on a drum.

(3) Steam blanching is preferable to water blanching. By means of a crane this operator lifts an iron basket full of diced carrots from the blanching vat.

(4) Raw pork being dehydrated at the Meats Laboratory of the Beltsville (Md.) Research Center of the United States Department of Agriculture.

(5) Specially designed machine pumps air from can, replaces the air with carbon dioxide and seals the can.

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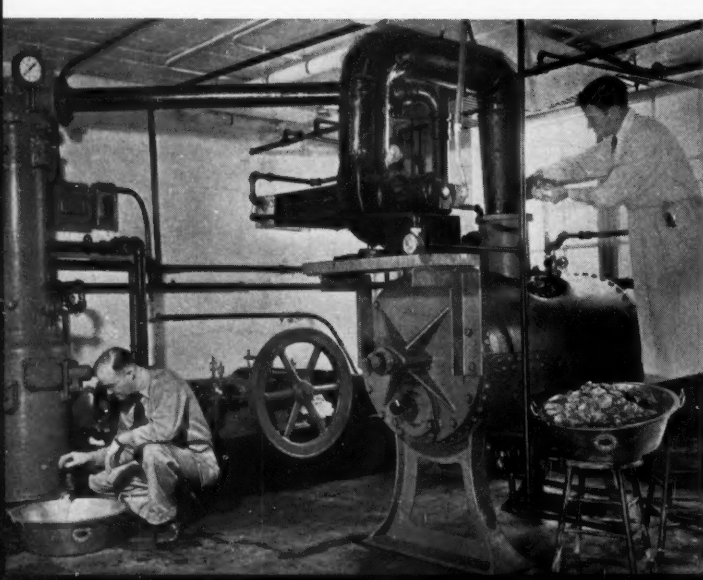

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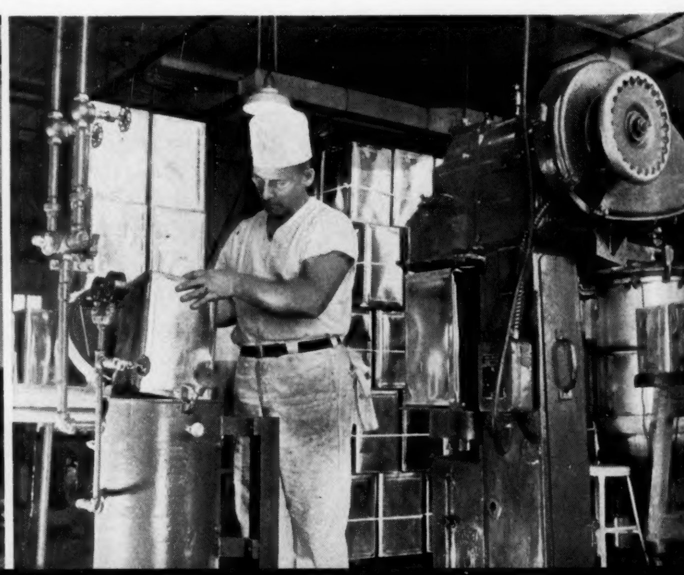

BOOKLETS & CATALOGS

Chemicals

A487. *Adhesives and Coatings* for textiles, boats, pontoons, glass fabrications, metals, electrical equipment, etc. are listed in new folder. According to the company all those described have met contract specifications. Union Bay State Co.

A488. *Agricultural Developments.* Lead article in March issue of *Du Pont Magazine* reviews the new discoveries in agricultural field including development of resistant strains, new plant varieties, vitamins and hormones for plants, chemical control of pests, and weed and parasitic controls. Another article discussed the role of polyvinyl resins as rubber substitutes. E. I. du Pont de Nemours & Co.

A489. *Colloidal Graphite* used as a parting compound for screw threads, lamp bulbs, its applications in glass, foundry, and rubber industries are described in illustrated bulletin No. 422-T. Acheson Colloids Corp.

A490. *Nickel Alloys.* 16-page bulletin presents comprehensive data on eight nickel alloys and their corrosion resistant uses in chemical process industries. Service characteristics of the metals, mechanical properties, physical constants and other pertinent data are given in comparative tables and charts. Briefed instructions for machining, heat-treating, welding and other fabricating operations are included. The International Nickel Co., Inc.

A491. "*Perfume Compounds and Specialties* for the Cosmetic and Allied Industries" is 20-page price list that includes paint deodorants, rubber deodorants, and para-perfumes among other perfuming materials. Schimmel & Co., Inc.

A492. "*Rohm & Haas Reporter.*" First issue of an attractive, interesting, and informative 12-page house organ. Articles tell the story of oropon, first synthetic leather bate and cornerstone of Rohm & Haas Co.; development of synthetic insecticide; new production units for acrylics; Hyatt award presented to Dr. Frederick of R. & H. for Plexiglas development. Excellent use of photographs. Rohm & Haas.

A493. *Rust* and its prevention, indoors and out-of-doors, are explained in folder. For machine parts, fabrications, assemblies, etc. Black Bear Co., Inc.

A494. *Safety.* National Safety Council offers a series of authoritative manuscripts to solve accident problems which right now are causing serious trouble in many industries. Among these are: *The Production Value of a Well Rounded Accident Prevention Program*—H. L. Cox, Carbide and Chemicals; *The Use of Conductive Flooring and Materials for the Elimination of Static Electricity*—E. J. Meyers, du Pont; *Demonstration and Discussion of Various Respiratory Protective Equipment*—H. H. Schrenk, U. S. Bureau of Mines; *Safe Use of Substitute Solvents and Chemicals*—J. H. Sterner, Eastman Kodak; *Occupational Disease Factors*—Lemuel C. McGee, Hercules Powder; *The Effect of Lengthened Hours on Safety Problems in the Rubber Industry. Male and Female Employees*—Lucy O. Norton, General Electric Co., National Safety Council.

A495. *Styraloy 22* is a synthetic thermoplastic resin of hydrocarbon type, said to possess good low temperature flexibility, excellent electrical properties, and stability to corona discharge at elevated temperatures. Its engineering properties and fabrication techniques are listed in 13-page bulletin introducing the elastomer. Replete with charts, diagrammatic sketches, and photographs. According to its manufacturers its properties suggest applications as insulating material, intermediate frequency coaxial cables, and mechanical applications where flexibility is required. The Dow Chemical Co.

A496. *Textiles.* Flame-proofing compound for textiles and mildew resistant formula for thread are described in Feb. issue of *The Needle's Eye.* Union Special Machine Co.

A497. *Work Shift Schedule.* Attractive cardboard shiftograph simplifies scheduling shifts. Covers four different plans for achieving high degree of activity when rotating crews. Will be of interest to plant superintendents. George S. May Co.

Equipment — Containers

E845. *Acid Feeding Equipment* (double displacement) designed for feeding of small quantities of corrosive solutions where continuous, accurate proportioning of one fluid to another is desired is detailed in Publication No. 4009. Flow diagrams illustrate installation of various systems. Cochrane Corp.

E846. "*Aluminum, Welding and Brazing Alcoa,*" is rewritten edition of welding booklet, incorporating art of brazing. One hundred pages include detailed instructions, good close-up photographs, step-by-step sketches outlining procedures to be followed, and tables listing machine settings, temperatures, oxygen and hydrogen pressures, etc. for gas, arc, electric-resistance welding and furnace, torch, and dip brazing. Good standby for plants. Aluminum Co. of America.

E847. *Automatic Control Equipment*—magnetic contactors, reversing controls, automatic reset timers, process timers, program clocks, remote control switches, automatic transfer switches, etc. are listed in Bulletin No. 720. Details of construction, latest improvements, applications, prices, and sketches of equipment catalogued. Zenith Electric Co.

E848. *Bags.* The situation in burlap and paper for bags is discussed in Feb. issue of *Bagology,* which covers the international repercussions as well as WPB conservation orders. Chase Bag Co.

E849. *Band Saw* for companies engaged in metal fabricating work is described and illustrated in 4-page booklet. Johnson Mfg. Corp.

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E854. *Corrosive Conditions* and recommendations for their correction are tabulated in quick reference guide for the proper bitumastic paint or coating. Detailed instructions on how to paint a concrete floor are included in No. 21, 1943 of *Bitumastic Bulletin.* Wailes Dove-Hermiston Corp.

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E857. *Flexible Glass*, the research leading to its discovery, automatic control essential for its manufacture, and its applications are featured in Vol. 2 No. 4 of "Wheelco Comments." Wheelco Instruments Co.

E858. *Flow Controllers*, dimensions and specifications are listed in Bulletin No. 250. Tables contain specifications on standard horizontal and vertical controllers having elbow or straight through outlet connections, shut-off, clear well control types, and fluid counterweight dimensions required for rate changing from operating floor and master control. Simplex Valve & Meter Co.

E859. *"Glass Lining."* The role of glass in the war, from glass containers for dehydrated foods to equipment for medical research laboratories is featured in the winter issue of this publication. Also article on high duty agitation in glass lined reactors. The Pfaudler Co.

E860. *Lighting*. New government manual and price schedule on lamps and lighting for government procurement agencies, purchasing personnel, and lighting engineers is now available. The handbook analyzes the five main types of lighting requirements. Describes the Superlite light conditioning bulb for use without fixtures, globes or shades and the Birdseye infra-red heat lamps for speeding up industrial baking, drying and dehydrating. Birdseye Electric Corp.

E861. *Liquid Level Gauges* for indicating liquid levels in tanks from 3 to 80 feet high are listed in Bulletin No. 40. Trimount Instrument Co.

E862. *Packing*. Current 12 page issue (No. 10) of Acme Process features various uses of steel strapping employed to hold bullet sealing materials to airplane fuel tanks, packing oil pipeline for North Africa, strapping parachute flare parts. Acme Steel Co.

E863. *"Photoelectric Relays for Automatic Control"* describes the purpose and construction of each part of a relay. Also tabulates type of relays, contactor rating amperes, minimum time of response, types of tubes, application, and illumination data. Lists general-purpose relays, light sources and accessories. GEA-1755E. General Electric Co.

E864. *Plastic Parts* for war production applications are photographed in folder. Emphasizes that these plastic fabrications are done without molds. Creative Plastics Corp.

E865. *Reconditioning Worn Pump Shafts and Rods* by building up worn parts to original size by means of welding, metal spraying, and electroplating is detailed in Vol. 6 No. 2 of "Mechanical Topics." Shear properties of metals are described in another article and listed in tables. The International Nickel Co., Inc.

E866. *Rotary Pumps*. To simplify servicing of rotary pumps, this check chart in card form, punched at top center to be hung near a pump installation, will remind maintenance men to service equipment. Cards will be mailed upon receiving request specifying Form No. SER-1. Blackmer Pump Co.

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E868. *Spray Problems* are solved interestingly in this 32-page booklet which shows how spray operations are conducted in munitions, baking, leather, and structural steel industries. Illustrated. Eclipse Air Brush Co., Inc.

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Industrial Applications Of The Nitroparaffins

By Walter E. Scheer
Commercial Solvents Corporation

Although known for many years as laboratory curiosities, nitroparaffins were not studied seriously until about eleven years ago when Professor Henry B. Hass of Purdue University began to work on the direct nitration of paraffin hydrocarbons. Since that time long strides have been made in nitroparaffin chemistry as evidenced in this discussion of their industrial applications.

FOR over 60 years the nitroparaffins were expensive laboratory curiosities known to only a few chemists. In 1935 Commercial Solvents Corporation acquired from the Purdue Research Foundation licenses under their patents relating to the vapor phase nitration of paraffin hydrocarbons and the utilization of the nitration products in the production of numerous derivatives. Five years of intensive research were required to work out the numerous engineering problems involved in adapting this process to large scale equipment. During this period laboratory investigations were carried on to uncover uses for the nitroparaffins and their derivatives. At the same time an exhaustive market survey was conducted by the Commercial Solvents Technical Service Division. As a result of this ground work many uses for these chemicals were known when the nitroparaffin plant was placed in operation in May, 1940. The first tank car shipment was made in the fall of 1941 and the demand for the nitroparaffins and their derivatives soon exceeded production capacity. Before long practically the entire output was required for essential war uses.

Looking toward the future Commercial Solvents is already planning the construction of a much larger plant.

In this article some of the more important uses for the four nitroparaffins and their eighteen derivatives now in production will be discussed. The uses which are described show the wide variety of industries which are utilizing the nitroparaffins. No attempt has been made to list the patents and literature references which may pertain to the uses mentioned, since such a survey is considered outside the scope of this article.

Solvent Uses

The four nitroparaffins, whose properties are shown in Table 1, are medium boiling, non-hygroscopic liquids with evaporation rates in about the same range as those of butyl acetate and toluol. Their physiological properties have been studied by the Kettering Laboratories of Applied Physiology and their toxicities were found to be about the same as those of butyl acetate, amyl acetate, and of petroleum naphtha which evaporates in approximately the same range. The nitroparaffins have fairly high flash points and present no special fire or explosion hazards. They dissolve a wide variety of synthetic resins and cellulose esters and are finding commercial application as solvents in the coating industry This use for the nitroparaffins has been described in considerable detail elsewhere and is only briefly covered here Solvent uses for the nitroparaffins other than those in the protective coating industry are discussed later.

The nitroparaffins are excellent solvents for cellulose acetobutyrate and, when mixed with an alcohol, for cellulose acetate. With the nitroparaffins it is now possible to formulate cellulose acetate and cellulose acetobutyrate lacquers which have the same desirable characteristics of good flow, rapid hardening of films, and freedom from blushing, as high grade nitrocellulose lacquers. The nitroparaffins are being used commercially as solvents in cellulose acetate and cellulose acetobutyrate lacquers and dopes and also in adhesives used in connection with these products. One important use for cellulose acetobutyrate is in dopes for aircraft. Because of their high tolerances for diluents and favorable evaporation rates the nitroparaffins have a definite place in these acetobutyrate airplane dopes. In order to save labor, by reducing the number of coats required, some of the dopes are applied in a hot condition and here the nitroparaffins should prove especially desirable to prevent the coatings from drying too rapidly.

While the nitroparaffins themselves are not solvents for cellulose triacetate, mixtures of nitroparaffins with low proportions of chlorinated hydrocarbons will dissolve this ester. Since most chlorinated hydrocarbons are corrosive and toxic it is preferable to use only relatively small proportions of these in combination with larger amounts of the nitroparaffins and other volatiles. The advantages of such solvent mixtures should greatly increase the utility of cellulose triacetate lacquers.

The nitroparaffins are good solvents for nitrocellulose but are not widely used with this material because they have no particular advantage for most applications over butyl acetate and butanol. However, there are some specialty nitrocellulose lacquers in which the nitroparaffins are being used because of their mild and non-persistent odor, insolubility in water, and their resistance to hydrolysis in the presence of alkalies. They are also useful in obtaining nitrocellulose dopes of exceptionally high solids content and in formulating nitrocellulose lacquers used for coating cellulose acetate plastics.

Table 1

	Nitromethane	Nitroethane	1-Nitropropane	2-Nitropropane
FORMULA	CH_3NO_2	$CH_3CH_2NO_2$	$CH_3CH_2CH_2NO_2$	$CH_3CHNO_2CH_3$
Molecular Weight	61.04	75.07	89.09	89.09
Specific Gravity at $\frac{20°}{20°}$C	1.139	1.052	1.003	0.992
Pounds per U. S. Gallon at 20°C	9.48	8.75	8.35	8.24
Melting Point, °C	−29	−90	−108	−93
Boiling Point, °C	101.2	114.0	131.6	120.3
Flash Point, °F (Tag open cup)	112	106	120	103
Vapor Pressure, mm at 20°C	27.8	15.6	7.5	12.9
Surface Tension, dynes per cm at 20°C	37.0	31.3	30.0	30.0
Refractive Index at 20°C	1.3818	1.3916	1.4015	1.3941
pH 0.01M Aqueous Solution at 25°C	6.4	6.0	6.0	6.2
Rate of Evaporation, by wt. (n-Butyl Acetate = 100)	180	145	100	124
Solubility at 20°C				
ml Solvent in 100 ml Water	9.5	4.5	1.4	1.7
ml Water in 100 ml Solvent	2.2	0.9	0.5	0.6

One of the most promising commercial applications developed for the nitroparaffins is as solvents for vinyl chloride-acetate copolymer resins of the type containing 85-90% polyvinyl chloride, such as Vinylite VYHH, VYLF, VYNS, and VMCH. The nitroparaffins are the most powerful boiling solvents known for these resins. They give solutions of lower viscosities than do other solvents of equivalent evaporation rate, such as methyl isobutyl ketone, and therefore larger proportions of cheap diluents can be used in nitroparaffin solvent mixtures. Another grade of vinyl resin, known commercially as Vinylite VYNW, is a more highly polymerized type and therefore more difficult to dissolve. Cyclohexanone is one of the very few true solvents for this resin. The nitroparaffins are employed with this resin in mixtures with aromatic hydrocarbons and small proportions of cyclohexanone. Thus by using nitroparaffins and hydrocarbon diluents it is possible to make solutions of Vinylite VYNW containing only a few per cent of cyclohexanone. These solutions are often applied at elevated temperatures when used for coating cloth or as cements.

Before the war 2-nitropropane was used in vinyl resin solutions for coating beer and fruit juice cans and for many other applications where a corrosion resistant finish is desirable. Large amounts of nitroparaffins are now employed in vinyl resin solutions used in place of rubber as dopes or cements for coating cloth. Some of the articles on which these dopes and cements are used are Army raincoats, gas masks, life boat and barrage balloon cloth, aviators' life jackets, and bullet-proof gasoline tanks.

The nitroparaffins are being used commercially as solvents for Hycar O.R., an oil resistant synthetic rubber, and it seems quite likely that they will also find application as solvents for similar synthetic elastomers.

The nitroparaffins are good solvents for some grades of Formvar, reportedly a polyvinyl formal resin. Formvar can be dissolved in mixtures of nitroparaffins, alcohols, and toluol, containing fairly low proportions of nitroparaffins. It is insoluble in all other solvents suitable for use in protective coatings.

The nitroparaffins have also been used in coatings based on zein, a vegetable protein derived from corn. Zein is ordinarily dissolved in alcohol-water mixtures. However, it has been found that the addition of a small amount of a nitroparaffin, particularly nitromethane, decreases the tendency of zein solutions to gel and permits the use of less water in the solvent mixture, thus reducing blushing tendencies.

In addition to their use as solvents in the protective coating field, the nitroparaffins have also shown promise in a number of other solvent applications. They have been proposed for the solvent refining of lubricating oil and other hydrocarbons. In the dry-cleaning industry 2-nitropropane has been used as an ingredient of special spotting fluids because of its excellent solvent properties for a wide variety of stains. In the textile field 2-nitropropane is an ingredient of compounds used for scouring and kier boiling cotton fabrics. For this application an emulsion of 2-nitropropane containing other materials is employed.

Because of their solvent properties it is not surprising that nitroparaffins are effective ingredients of paint and varnish removers. While their present price is not competitive, they may find use in specialty products. It has been found that the inclusion of about 20-25% of nitroethane or 2-nitropropane in an ordinary paint remover will cause it to attack many baked synthetic finishes not usually affected.

Chemical Uses

Increasing quantities of nitroparaffins are used as raw materials for chemical synthesis. In addition to the various derivatives, shown on the flow sheet in Figure I, a number of other materials are also produced from the basic nitroparaffins. Nitromethane is being chlorinated to make chloropicrin, and this synthesis may some day replace entirely the method of manufacturing chloropicrin from picric acid and bleaching powder. While chloropicrin is usually considered as a war gas, it is employed in large quantities as a soil larvicide and fumigant.

A number of fine chemicals which are of considerable interest in the pharmaceutical and aromatic specialty fields have been made from nitroparaffins by condensing them with aromatic aldehydes, such as benzaldehyde, and reducing the resulting nitroalcohols and nitro olefins. A few materials of this group are β-phenylisopropylamine (amphetamine), synthetic ephedrine, 2-amino-1-phenyl-1-propanol, phenylacetone and β-phenylisopropyl alcohol.

The nitroparaffins are mildly acidic and are of interest as acid catalysts in resin production and other chemical reactions. Since they are mild oxidizing agents their use for this purpose in chemical reactions is indicated. The nitroparaffins have been proposed as additives in diesel fuels.

Nitrohydroxy Derivatives

Only one of the five nitrohydroxy compounds being produced, 2-nitro-1-butanol, is a liquid. Since it is a nitroalcohol it possesses the combined solvent properties of a straight nitroparaffin and of an alcohol but has a much slower rate of evaporation. It is an excellent high boiling solvent for zein and for many resins used in coatings and printing inks. It dissolves a number of dyestuffs and has been used in non-grain-raising wood stains.

2-Nitro-2-methyl-1-propanol is an effective heat sensitizer for synthetic and natural rubber latices and for similar dispersions of some of the important substitutes for rubber. Heat sensitizers are used in the production of sponge rubber articles where they cause an aerated latex dispersion to gel on heating so that it can be removed from the mold and cured while still in an aerated condition.

The nitroglycols and tris(hydroxymethyl)nitromethane have been proposed as ingredients of textile finishes and textile printing compounds.

All five nitrohydroxy compounds can be used as sources of nascent formaldehyde, employed as a reducing agent or in the manufacture of special types of synthetic resins and other chemicals. In the presence of alkaline materials aqueous solu-

Figure I

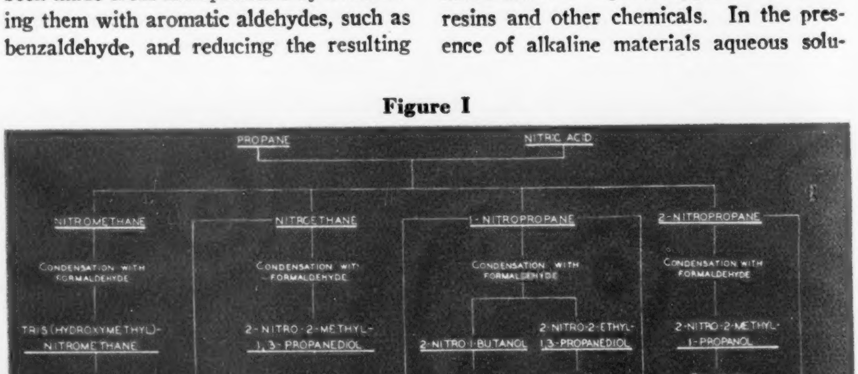


FIGURE I - FLOW SHEET OF NITROPARAFFINS AND DERIVATIVES NOW IN COMMERCIAL PRODUCTION

Table 2

	2-Nitro-1-butanol	2-Nitro-2-methyl-1-propanol	2-Nitro-2-methyl-1,3-propanediol	2-Nitro-2-ethyl-1,3-propanediol	Tris(hydroxymethyl)-nitromethane
FORMULA	NO_2 $CH_3CH_2CHCH_2OH$	NO_2 CH_3CCH_2OH CH_3	NO_2 CH_2OHCCH_2OH CH_3	NO_2 CH_2OHCCH_2OH C_2H_5	NO_2 CH_2OHCCH_2OH CH_2OH
Molecular Weight	119.12	119.12	135.12	149.15	151.12
Melting Point, °C	−47 to −48	90 to 91	147 to 149	56 to 57	165 to 170
Boiling Point at 10 mm, °C	105	94.5 to 95.5	Decomposes	Decomposes	Decomposes
pH of 0.1M Aqueous Solution at 20°C . . .	4.5	5.1	5.4	5.5	5.6
Solubility in Water—grams per 100 ml at 20°C . .	20	350	80	400	220

tions of the nitrohydroxy compounds decompose to form formaldehyde and the original nitroparaffin. Advantage can also be taken of this property in the mirror industry where nascent formaldehyde produced in this manner acts as a reducing agent in the silvering operation. The nitrohydroxy compounds have been used as raw materials in making a large number of derivatives, including the amino-hydroxy compounds described later. The nitrohydroxy compounds undergo many of the reactions typical of other similar compounds containing hydroxy groups, such as alcohols, glycols, and glycerine. The resulting derivatives usually have higher boiling points than the corresponding products without the nitro group. A large number of the nitroalcohol esters have been prepared and their properties reported. The mixed esters of phthalic anhydride with an aliphatic alcohol and a nitroalcohol have been found to be excellent plasticizers in cellulose acetate molded products where they have the advantage of being practically non-volatile. A specific example of such an ester is methyl 2-nitroisobutyl phthalate, made from methanol, 2-nitro-2-methyl-1-propanol, and phthalic anhydride.

The nitroglycols and tris(hydroxymethyl)nitromethane react with aldehydes to form nitro acetals and from these the corresponding amino acetals can be made. From these compounds high molecular weight surface-active agents have been derived which show promise in the textile field.

The esters of nitroglycols and dicarboxylic acids have been suggested as plasticizers for urea formaldehyde resins. Nitroglycols and tris(hydroxymethyl)-nitromethane have also been investigated in other resin syntheses, where they often react in the same manner as glycols and glycerine. Some of the esters of nitrohydroxy compounds and higher fatty acids such as oleic or stearic show promise in textile finishes. Some of the nitrohydroxy compounds have been suggested as additives to improve the ignition qualities of diesel fuels.

The trinitrate of tris(hydroxymethyl)-nitromethane, known as "nib nitroglycerine," is reported to be a valuable explosive similar to nitroglycerine, with the advantage of better stability and lower melting point. The carbon, hydrogen, oxygen, and nitrogen balance in this explosive is such that the end products of its decomposition are carbon dioxide, nitrogen, and water, and sufficient oxygen is present in the molecule to convert all of the carbon to CO_2 and all of the hydrogen to water.

Aminohydroxy Derivatives

When mixed with approximately the equivalent amount of a fatty acid such as oleic or stearic these five aminohydroxy compounds form soaps which are emulsifying agents for oils, fats, waxes, resins, and similar materials. These soaps are less alkaline and have a wider range of solubility than the corresponding inorganic soaps. They are used in the manufacture of such products as water resistant, bright-drying floor waxes; emulsion paints and other emulsions used as protective coatings; textile chemical specialties; shampoos and cosmetics; soluble oils used in the machine tool, insecticide, and leather fields; latex, synthetic rubber, and casein emulsions; adhesives; textile printing and dyeing pastes; cleaning and polishing compounds; and leather and shoe dressings.

The aminohydroxy compounds are now being used extensively for war work. Large quantities of aminomethylpropanol are employed as emulsifying agents in emulsion-type camouflage paints which are essentially mixtures of drying oils, resins, pigments and thinners. They are mixed with water in the field and must therefore form stable emulsions with all kinds of water, including hard and soft water and even sea water. Aminomethylpropanol is preferred in these emulsion paints because of its great emulsifying power and since paints made with it have good water resistance and wash fastness on drying, an all-important requirement for outdoor paints.

Aminomethylpropanol has also been used successfully in pigment emulsions applied to textiles. These are employed in the "pigment dyeing" of Army fatigue uniforms and mosquito netting and have saved large amounts of scarce vat dyestuffs. In pigment dyeing, the cloth is coated with an emulsion of pigment and binder instead of being dyed. Aminomethylpropanol has given excellent results as an emulsifying agent in pigment dyeing and the finished textile materials are fast to light and laundering.

The aminohydroxy compounds are used in the textile specialty field, not only in the form of their soaps but also as raw materials in the manufacture of derivatives. These derivatives are usually hydroxy amides and other complex products made by condensing the aminohydroxy compound with a high molecular weight fatty acid. The soaps and condensation products made from the aminohydroxy compounds are used in the textile mill as wetting agents, detergents, cation-active softeners, kier boiling compounds for cotton, boil-off assistants for viscose and acetate rayon, lubricants for yarns, and degumming powders for silk.

Aminobutanol and aminomethylpropanol are employed in preparations for cleaning metal automobile and aircraft parts and also in products used for pre-

Table 3

	2-Amino-1-butanol	2-Amino-2-methyl-1-propanol	2-Amino-2-methyl-1,3-propanediol	2-Amino-2-ethyl-1,3-propanediol	Tris(hydroxymethyl)-aminomethane
FORMULA	NH_2 $CH_3CH_2CHCH_2OH$	NH_2 CH_3CCH_2OH CH_3	NH_2 CH_2OHCCH_2OH CH_3	NH_2 CH_2OHCCH_2OH C_2H_5	NH_2 CH_2OHCCH_2OH CH_2OH
Molecular Weight	89.14	89.14	105.14	119.16	121.14
Melting Point, °C	−2	30 to 31	109 to 111	37.5 to 38.5	171 to 172
Boiling Point, °C	178^{760mm}	165^{760mm}	151 to 152^{10mm}	152 to 153^{10mm}	219 to 220^{10mm}
Specific Gravity at $\frac{20°}{20°}$C	0.944	0.934	. . .	1.099	. . .
pH of 0.1M Aqueous Solution at 20°C . . .	11.1	11.3	10.8	10.8	10.4
Solubility in Water—grams per 100 ml at 20°C . .	Completely Miscible	Completely Miscible	250	Completely Miscible	80

paring metallic surfaces prior to coating or plating.

The two aminoglycols and tris(hydroxymethyl)aminomethane have been used in resin syntheses, and some of the other aminohydroxy compounds have found commercial application as raw materials for the production of special dyestuffs.

Esters and amides of the aminohydroxy compounds have been shown to be very promising in the demulsification of crude oil emulsions.

Aminomethylpropanediol is an excellent amine for use in recovering and purifying an acidic gas. In this process the gas, such as carbon dioxide, is absorbed in an aqueous solution of aminomethylpropanediol forming an addition compound which decomposes on heating, releasing the gas in a pure state. The aminomethylpropanediol is returned to the system and, because of its non-volatility, can be used repeatedly with very little loss in the process.

There are a number of applications where the aminohydroxy compounds are used because of their mild alkalinity. One example is their use as alkaline catalysts in the production of phenol-formaldehyde and urea-formaldehyde resins. Aminomethylpropanol is generally used for this purpose. This amine has also found application as a corrosion inhibitor in lubricating specialties and one of its salts has been suggested to inhibit corrosion in brake fluids, shock absorber fluids, and liquid coolants.

Hydroxylammonium Salts

Hydroxylamine and its salts have been known for many years and literature references to them are numerous. However, because of their former high prices they were employed only as laboratory reagent chemicals, chiefly used for the identification of aldehydes and ketones and in the preparation of dimethyl glyoxime which is employed in the metallurgical industry for the determination of nickel. Hydroxylammonium salts are now made on a large commercial scale by the acid hydrolysis of primary nitroparaffins and are no longer laboratory reagent chemicals but industrial chemical raw materials sold in carload quantities. Industrial research chemists have reviewed the large number of literature references on hydroxylamine and many new uses have been developed for this product as a raw material in chemical synthesis. The three salts listed in Table 4 are now being made.

The lowest priced salt on the basis of its hydroxylamine content is the acid sulfate. However, where a purer product is necessary the sulfate or chloride is recommended.

Hydroxylammonium acid sulfate is reported to show promise as a dehairing agent for hides. It is a strong reducing agent and its use has been suggested in the mirror industry for silvering. However, the chief uses for salts of hydroxylamine are in the synthesis of new intermediates for dyestuffs, rubber chemicals, pharmaceuticals, aromatic chemicals, and textile specialties. Among the products made are indigo, which can be from aniline, chloral, and hydroxylamine; and sulfamic acid, from hydroxlyamine and sulfur dioxide.

	Hydroxylammonium Acid Sulfate	Hydroxylammonium Sulfate	Hydroxylammonium Chloride
FORMULA	$NH_2OH \cdot H_2SO_4$	$(NH_2OH)_2 \cdot H_2SO_4$	$NH_2OH \cdot HCl$
Molecular Weight	131.11	164.14	69.50
Melting Point, °C	Indefinite	162*	152*
pH of 0.1M Aqueous Solution at 25°C	1.6	3.5	3.4
Solubility—gm per 100 ml at 25°C			
In Water	Approx. 390	63.7	94.4
In 95% Ethanol	3.5	0.2	8.5
In Methanol	16.0	0.1	13.8

*Melts with decomposition

Table 4

Chloronitroparaffins

The five chloronitroparaffins listed in Table 5 are more active as solvents than the straight nitroparaffins. For example, 1-chloro-1-nitropropane will dissolve many of the new synthetic rubbers, including Buna N. Chemigum, Hycar O.R., and some grades of Neoprene.

The chloronitroparaffins undergo many of the chemical reactions typical of the straight nitroparaffins and have therefore been used in the synthesis of other chemicals such as chloronitroalcohols.

1-Chloro-1-nitropropane is an excellent anti-gelling agent for highly accelerated rubber cements. Because of their instability these cements were formerly made up in two parts to prevent gelling and these were mixed just prior to use. However, the addition of 1-chloro-1-nitropropane to these cements inhibits gelling and permits packaging them in one container rather than two.

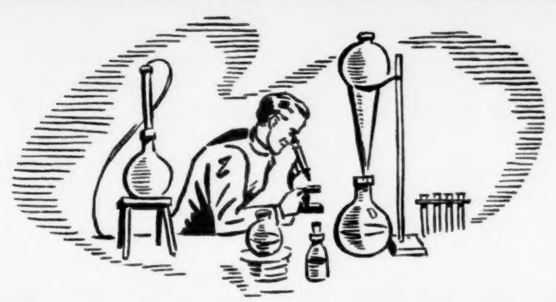
The chloronitroparaffins have also been suggested as diesel fuel additives.

One of the most promising chloronitroparaffins is 1, 1-dichloro-1-nitroethane which, under the trade name of Ethide, has proved to be a successful fumigant for stored grains, flour, tobacco, and many other products, Ethide is a powerful fumigant with excellent penetration properties. Because of its distinct warning odor and high flash point it is comparatively safe to handle.

As was indicated earlier in this article practically the entire production of the nitroparaffin plant is now going directly into essential war uses. Research, stimulated and accelerated by war-time needs, continues to uncover important new applications for these products. Post-war industry as a whole, and particularly the highly specialized industries, may find the nitroparaffins a fertile source of new chemicals for new products.

Table 5

	1-Chloro-1-nitroethane	1-Chloro-1-nitropropane	2-Chloro-2-nitropropane	1,1-Dichloro-1-nitroethane	1,1-Dichloro-1-nitropropane
FORMULA	$CH_3\overset{NO_2}{\overset{\vert}{C}}HCl$	$CH_3CH_2\overset{NO_2}{\overset{\vert}{C}}HCl$	$CH_3\overset{NO_2}{\overset{\vert}{C}}ClCH_3$	$CH_3\overset{NO_2}{\overset{\vert}{C}}Cl_2$	$CH_3CH_2\overset{NO_2}{\overset{\vert}{C}}Cl_2$
Molecular Weight	109.52	123.54	123.54	143.97	157.99
Specific Gravity at $\frac{20°}{20°}$C	1.258	1.209	1.193	1.405	1.314
Pounds per U.S. Gallon at 20°C	10.47	10.06	9.93	11.69	10.93
Distillation Range, °C (90%)	122.0–128.5	139.5–143.3	129.0–132.3	122.0–125.0	141.0–143.6
Flash Point, °F (Tag open cup)	133	144	135	168	151
Refractive Index, at 20°C	1.423	1.430	1.425	1.441	1.443
Solubility, at 20°C					
ml Solvent in 100 ml Water	<0.4	<0.8	<0.5	<0.5	<0.5
ml Water in 100 ml Solvent	<0.5	<0.4	<0.5	<0.5	<0.5



THE LABORATORY NOTEBOOK

Surface Roughness Analyzer

Early tracer instruments for the measurement of surface roughness employed an optical system to magnify the angular motion impaired to a mirror by the tracer point. A radically different approach to the problem of obtaining magnifications of the order of 100,000 times has been found by the use of an electronic amplifier as described in *The Frontier* published by Armour Research Foundation.

This principle has been incorporated in the Brush surface analyzer which consists, essentially, of a specially designed pick-up, an electronic amplifier, and a direct inking oscillograph for recording the magnified amplitude of the tracer point movements.

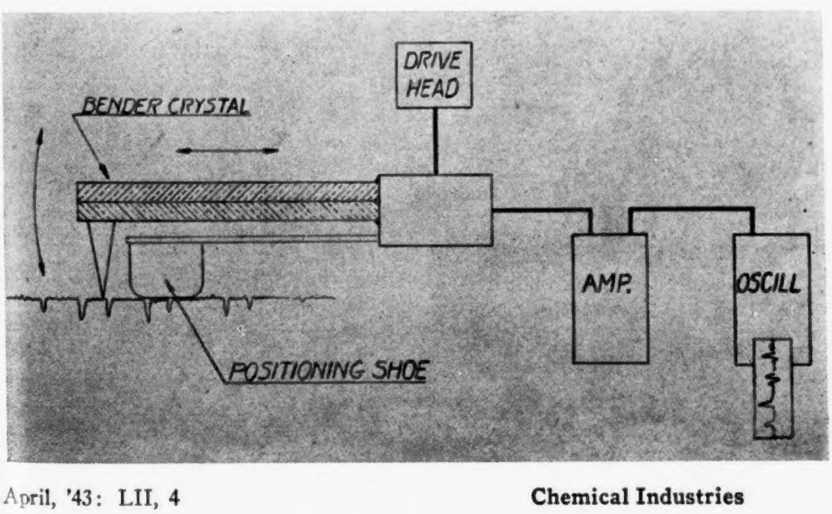
The design of the pick-up is of special importance in the functioning of this instrument. If it were possible to attach a very small tracer point by some dimensionless means to a transducer, the ideal pick-up design would be attained. Obviously, such a design can hardly be realized in practice. It has been found, however, that a close approach to the ideal is possible through the use of a small piezoelectric crystal of Rochelle salt.

The pick-up assembly consists of such a crystal, the tracer point and positioning shoe, and a supporting arm.

The magnification is provided by a three-stage electronic tube amplifier, which gives an over-all voltage gain of approximately 100,000. When the pick-up is connected to the amplifier, a voltage is developed which is proportional to the tracer point amplitude. The output of the amplifier actuates the direct inking oscillograph, which has an amplitude response proportioned to the voltage. Hence the pen of the oscillograph responds in proportion to tracer point amplitude, and can be used to record the roughness pattern, greatly magnified, on a moving chart.

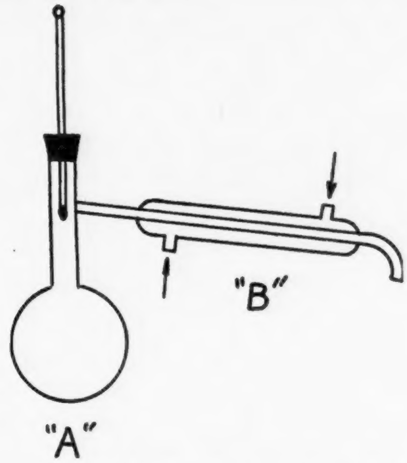
The movement of the tracer point over the test surface is controlled by a drive head powered by a synchronous motor, which imparts a constant-velocity reciprocating motion. In this way, the important operation of moving the tracer over the surface is freed from dependence on the human element.

The instrument can be calibrated, and its operation is simple. Offering means of obtaining data on surface character as well as roughness, it provides a method of evaluating industrial surfaces and surface characteristics.



Semi-Micro Distillations

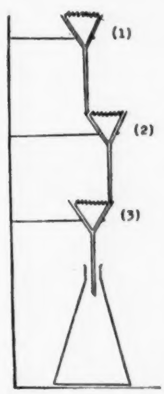
The organic chemical laboratory frequently needs a semi-micro distillation apparatus for organic analyses. The distillation apparatus illustrated has been used by Prof. M. Martin Maglio, St. John's University, for several years and is easily constructed. The delivery tube of a small distilling flask (about 10 ml. capacity or smaller, if desirable), *A*, is cut off so that an extension or stump of approximately ½" remains. A Pyrex microcondenser, *B*, is sealed on the stump and the delivery section of the condenser is bent as pictured.



This apparatus can also be used as a reflux condenser unit, for example in saponifications where it is desirable to distill the alcohol fraction after saponification is complete. During the process of saponification the unit can be tilted so that the condenser is raised to a position where the condensate can return to the flask. Another advantage is that the set-up is constructed solely of glass and has no joints. As to the microcondenser, an average glassblower can fabricate one of the type required here.

Rapid Filtration

Filtration of mixtures which are bulky and have a thick consistency is time-consuming. To speed up the operation the laboratory technician may resort to either a centrifuge or suction arrangement when available. If large amounts of the substance are to be separated, such devices are sometimes cumbersome.



When the precipitate is not needed for quantitative work and only the filtrate is required, J. C. Kapash in *The Chemist Analyst* suggests using a number of filters and arranging the funnels in a cascade as illustrated below. Fluted filter papers are used and the lower end of the stem of the topmost funnel is placed in the next lower funnel between paper and glass. This arrangement will eliminate unnecessary extension horizontally.

Suggestions Wanted

Have you any convenient, time-saving suggestions for use in the laboratory? Send them to CHEMICAL INDUSTRIES, *522 Fifth Avenue, New York, N. Y. We will pay $2 for each contribution published.*

NEW EQUIPMENT

Processing Mill — QC234

A special grinding, mixing, or compounding mill has been developed by Abbe Engineering Co. for relatively small or moderate size batches of wet or dry material. This mill makes it possible to fill, grind and discharge the material without removing the container from the frame.

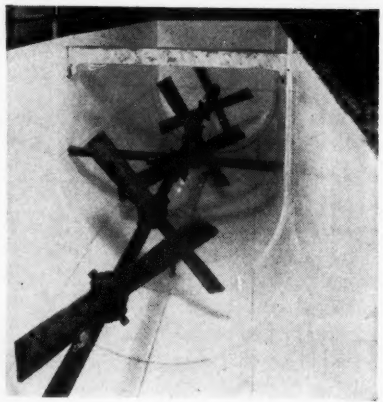
The metal jar or container, which can be made of any desired capacity, (the one illustrated is 15 gallons) has a cone shaped cover, gasketed and bolted to it. At the end of the cone there is a welded collar with a special rubber plug valve with a take-up lever working freely for charging and discharging the processed material without removing the grinding balls. If the grinding medium must be removed, the entire cone can be unbolted from the container.

The container is mounted in a U-shaped metal frame and is equipped with fittings so that it can be tilted vertically with valve up for charging or with valve down for discharging, and horizontally for grinding or mixing. The shaft from the U-frame is supported in two ball bearings, mounted on a welded enclosed base with a roller chain drive from the sprocket on the shaft running to an explosion proof, gear head motor mounted on a sub-base inside the housing. The wall plates of the housing are bolted to an angle iron frame and are easily removable for access to the motor.

Glass Tanks — QC235

The Pittsburgh Plate Glass Company has announced a line of glass tanks for applications requiring a non-corrosive, shock-resisting material. They use a minimum of critical material and are not just glass lined, but are actually tanks made of glass, made by building up the required shape and size of heavy tempered glass plates. The result is a rigid, permanent, sturdy tank, free from maintenance or wear.

The new method of heat treating gives to the tank material a physical strength four to five times greater than ordinary glass. Furthermore, the glass has a high resistance to thermal shock. It will withstand continuous operating temperatures of 650 degrees Fahrenheit and an instantaneous thermal shock of 400 to 500 degrees.

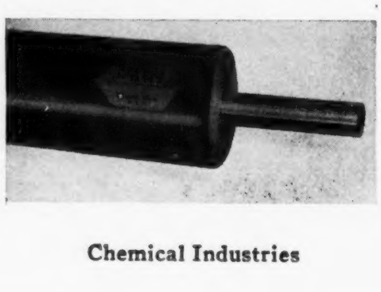


The joining problem is comparatively simple since the glass is made in large sheets; and on all tanks of medium size nothing but the corners are involved. All joints are accurately ground so that they resemble, in a sense, the ground stopper of a chemist's bottle. In addition, use is made of a joining material developed especially by the company's research laboratory for this purpose. The entire tank is usually surrounded by a wooden framework filled with a compound. This frame serves both as insurance against leaks and as protection against severe physical blows.

Plastic Covered Rolls — QC236

The illustration here shows one of the new Rodney Hunt Plastic Covered Rolls of "Shaf-tite" construction. This particular roll is about 5½" diameter with the No. 4203 Plastic covering, and is said to offer a number of practical advantages.

Basically, this is an all metal roll. The surface of the roll body has the plastic covering which provides a hard



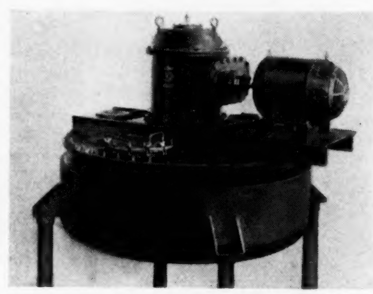
smooth glass-like surface, which the manufacturer claims is unaffected by most acids and alkalies. It is easily cleaned, and rates a high wear resistance.

This Roll is claimed to be ideal for such use as guide rolls, idlers, (also conveyor rolls) where exposed steel and iron is objectionable, but where hard smooth surface is desired.

Processing Kettle — QC237

For mixing or processing thick, heavy or viscous materials, creams or pastes which must be heated and which have a tendency to settle or cake at the bottom or adhere to the sides of the processing vessel, a special kettle has been designed by L. O. Koven & Bro., Inc.

This kettle is made of steel, stainless steel or any other metal required for the materials handled. It is of A.S.M.E. type all welded construction. A full steam or hot water jacket surrounds the kettle for heating the contents. The motor driven mixing and scraping mechanism consists of a U-shaped paddle agitator which, when rotated, simultaneously removes the material from the sides and concave bottom of the kettle, throwing it back toward the center. This plus the action of oblique blades supporting the U-shaped paddle shear through the mass, causing a more uniform kneading and dispersion. Constant removal of the material from the sides and bottom prevents caking and overheating and permits thorough and faster heating of the product.



A vapor-tight cover is bolted to the kettle. It is provided with two large, hinged, swing bolted manhole covers for easy opening and closing, two sight glasses and a flanged pipe connection for introducing liquids to the mixture.

Boiler Water Tester — QC238

The American Colloid Division of E. F. Drew & Co., Inc., has announced a new "F" Series of testing outfits to be used in the control of boiler feedwater conditions. This model has been designed to meet the needs of those companies which require a rather extensive analysis of their boiler water, including the factors of al-

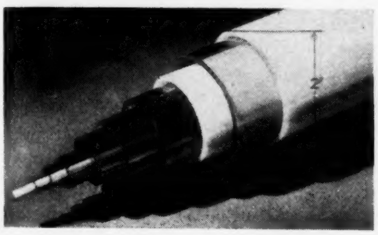
kalinity, hardness, phosphates, chlorides, pH value, and excess sodium sulfite.

The "F" Series testing outfit features the "Check Chart," which affords a constant graphic record of individual boiler conditions.

More complete units are available which provide, in addition, for analyses of dissolved oxygen, iron, sulfates, silica, and turbidity. Some of the more advanced models utilize electric-eye measurements for exceptional accuracy and speed in testing.

Plastic Tubing QC239

Extruded Plastics, Inc., recently announced that "Tulox" TT seamless plastic



tubing, extruded from Tennessee Eastman cellulose acetate butyrate, is now available in all diameters up to 2½" O.D.

Laboratory Furnace QC240

The Harry W. Dietert Company has announced a new laboratory combustion furnace, primarily designed for rapid carbon determination of steel and iron.

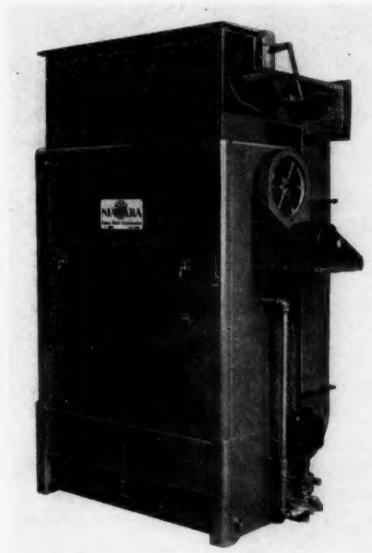
This "Glotemp" furnace is so designed that the "Globar" heating elements are placed at right angles to the combustion tubes. When the combustion tubes are placed at right angles to the heating

elements, the ends of the heating elements extend out of the sides of the furnace. This allows one to use shorter combustion tubes.

This new placement of heating elements in a laboratory furnace is said to make for a condensed and very efficient heating chamber and for fast combustion of iron and steel samples, whether the carbon is determined volumetrically or gravimetrically.

Temperature Control QC241

A new method of automatic temperature control for the Niagara Aero Heat Exchanger as used for cooling industrial liquids has been announced by the Niagara Blower Co.



This method is based on controlling the amount of outside air passed through the evaporative cooling chamber rather than altering the flow of liquid being cooled.

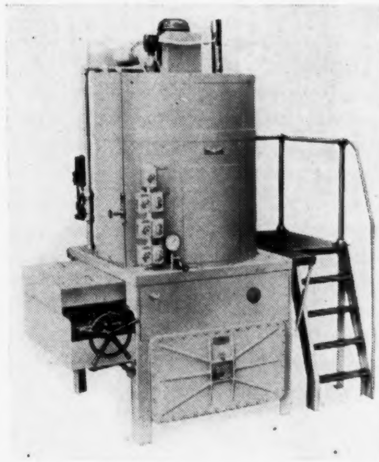
The apparatus comprises a recirculating air duct to which outside air is admitted by dampers controlled by a thermostat in the liquid line where it is always in contact with the full flow of the liquid being cooled. Only the minimum amount of outside air is admitted, keeping spray water temperature above freezing to prevent damage to equipment in cold weather.

New Oil Reclaimer QC242

A new model oil reclaimer to be used in salvaging high grade oil drained from the aircraft engines is now being manufactured by the Youngstown Miller Company.

These new models, now in use by several aircraft engine builders, have a capacity of 200 gallons of dirty oil in 90 minutes and restore the used oil to new oil values of viscosity, fire and flash, neutralization number, color, etc.

This purifier is of contact earth filtration type, utilizing common refinery earths available on the open market and is designed to remove non-lubricating volatiles by slow heating; solids and asphaltic material by filtering; and is capable of removing fuel dilution, water, acids, solid and colloidal carbon, dirt and similar matter. Insofar as the contaminants are concerned, the oil can be restored for reuse in the same manner and place as the new parent oil.



The dirty oil is charged to the reclaimer with an oil pump that has an automatic float control which controls the quantity into the machine. The operator next adds a bulk refiners earth, then turns on the switch which starts the electric heaters and agitator motor. The machine is then in operation under thermostatic control. When the mixture of heated oil and earth reaches the proper temperature, signal lights indicate to the operator when the batch is ready for delivery to finished tanks through the filter press which separates the oil from the dirty earth. The earth remains, together with the contaminants which it has removed from the oil, in the filter press as a dry cake.

Steel-Saving Conveyor Trough QC243

Link-Belt Company has announced the development of a screw conveyor trough that is made of a combination of steel trough bottom, wooden sides, and wooden cover board, lag-screwed together to form a complete, tight enclosure for the screw and the material it conveys.

A substantial percentage of steel is saved compared to the all-steel trough and cover plate heretofore furnished.

A new combination wood and steel trough is adapted to all standard screw conveyer fittings, will readily connect with existing steel trough, and can be shipped with sides and bottom assembled.

The curved bottom is made of steel no heavier than No. 10 gauge, and has the advantage of being removable by unscrewing of the lag screws securing it to wooden trough sides.

PLANT OPERATIONS NOTEBOOK

By W. F. Schaphorst

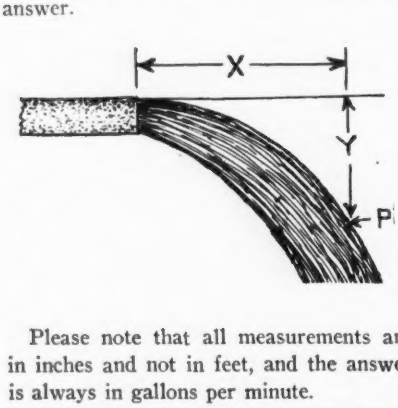
Flow from Open Pipe

The quantity of water or any other liquid flowing from a horizontal pipe, as shown in the accompanying sketch, can be computed with surprising accuracy by simply measuring the horizontal distance X and the vertical distance Y to any convenient point P as indicated by the dimension lines.

This is possible because of the well known law of physics which tells us that a horizontally projected body falls vertically from a state of rest.

I shall not go through the derivation of the following rule, but it will enable you to determine the quantity of water or other liquid flowing from a horizontal pipe. The wording in italics is the rule. The wording in regular type shows how the rule is applied.

RULE: Measure the internal diameter of the pipe in inches, and "square it." Thus if the internal diameter is 2 inches you will have 2 x 2 equals 4. *Then multiply by the distance X in inches.* Thus if the distance X is 20 inches you will have 4 x 20 equals 80. *Then multiply that by 2.56.* Which gives us 80 x 2.56 equals 204.8. *Lastly, divide that by the "square root" of the distance Y.* Thus if the distance Y is 25 inches, the square root of 25 is 5. Dividing 204.8 by 5 we get 44.96 gallons per minute, which is the answer.



Please note that all measurements are in inches and not in feet, and the answer is always in gallons per minute.

A short cut that will make your work easy is to choose a point P that is down a distance 9 inches, 16 inches, 25 inches, 36 inches, etc., because their square roots are exactly 3, 4, 5, and 6 respectively. In that way it will not be necessary for you to refer to tables of square roots or to arduously extract a square root by "longhand."

In the event that you might want to convert the answer into cubic feet per minute, divide the above answer by 7.5 as there are approximately 7.5 gallons in a cubic foot.

Installing Suction Pump Piping

Fig. 1 shows an important detail that should be borne in mind when installing any kind of pump. Or, in the event that your pump is giving trouble incorrect piping installation details such as shown here may be the reason why.

Usually a small amount of air is present in all water hence if any point in the suction piping (from well to pump) is higher than the level of the pump, the air will automatically separate from the water and will form a pocket in the high point of the line. The air will gradually collect there until it reaches such a volume that it merely compresses and expands with the piston strokes. There will then, of course, be no flow of water.

The sketch shows the proper method of piping. Note that the suction line should be laid with a gradual slope from the pump to the water supply. The slope of the pipe should be at least 1 inch to each 15 feet.

Just above the proper piping method the wrong way is indicated by means of lighter lines. If suction piping is installed in this manner the air will collect along the top of the horizontal pipe as shown. If, for any reason, you are forced to use such a method of piping be sure to use a tee and plug instead of the first elbow. You can then release the accumulated air when necessary. Also above the proper piping method another wrong method is shown. Notice that the elbow leading to well is slightly higher than the pump cylinder. Notice how the air collects at that high point.

Careful attention to this diagram while installing suction piping will save time and trouble. The suction line must be air-tight. Special care must be taken to lead or paint all joints to guard against leaks. If the suction line leaks, the pump will not work.

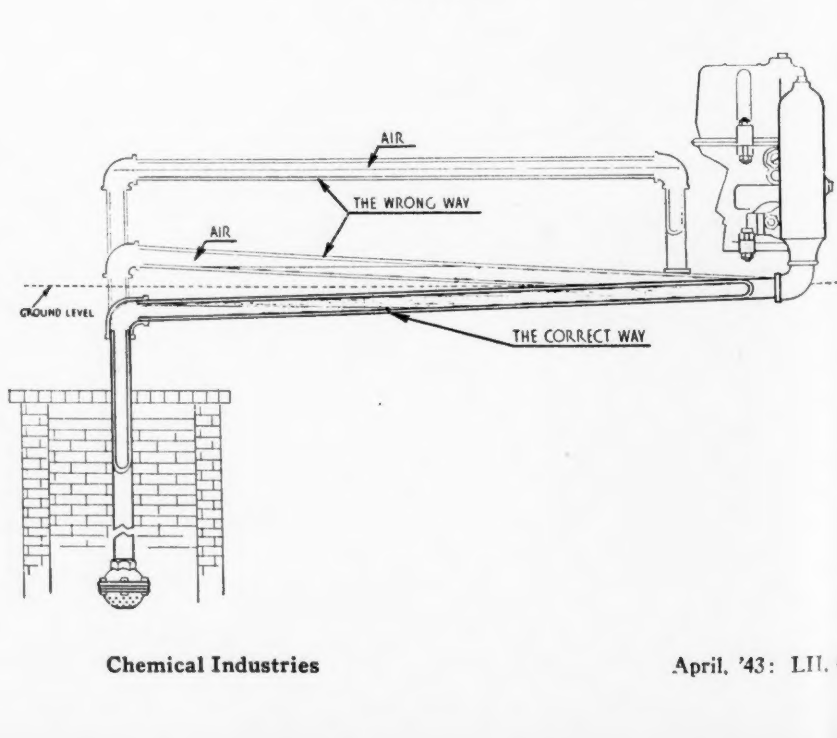
An "almost horizontal" suction line is practical up to 1000 feet, but great care must be taken to gradually slope from the pump to the well. The longer the suction line, the greater the strain on the suction valves in the pump. On suction lines over 100 feet in length it is essential to use an extra vacuum chamber to relieve the suction valves and also to guard against water hammer.

Salesmen Can Help

Much money is wasted annually by purchasers of equipment who refuse to allow reputable manufacturers to cooperate to the fullest extent.

For example, I know salesmen who have had years of experience with lubricating problems of all kinds. They know lubrication from A to Z. Yet they are not admitted into many plants to look

Figure 1



things over and to be certain of the exact conditions. Out in the vestibule they must "imagine" more or less what the problem is. Very often, to be sure, one's imagination may be correct, but in the long run I am sure that nothing is gained by keeping a first class experienced salesman out.

Many modern salesmen are practical engineers. I have in mind one salesman who is not a graduate engineer but who has been selling engineering equipment for so many years and has experienced so many problems that he knows machinery better than most engineering college graduates. As a result of being permitted into one plant in an eastern city more than two tons of coal are now being saved daily which would not have been saved had the salesman been kept out in the vestibule. This salesman discovered serious leaks which the engineer in the plant did not know existed.

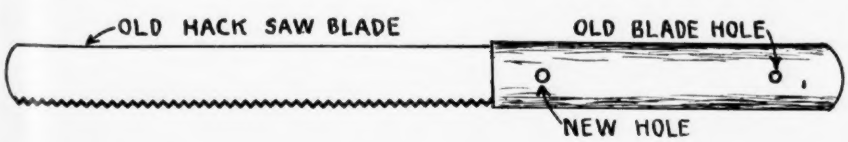
Please do not misunderstand me to claim that this applies to All salesmen. Judgment is necessary in deciding whether or not a salesman is capable. As a general rule reputable manufacturers employ only high grade men, but that is not an infallible rule. Most experienced buyers can quickly "size up" a salesman after a few minutes conversation with him and more or less instinctively know whether or not the salesman "knows what he is talking about."

Hacksaw "Knife"

This sketch shows how to make good use of old hacksaw blades. Provide the end with a wooden handle, as indicated, and you are all set for a wide variety of cutting jobs that are otherwise handled with difficulty. For instance this writer doesn't know of a better "knife" for cutting piston rod packings, for cutting through metal that is not get-at-able with an ordinary hacksaw, and so on endlessly.

There is a hole in the end of every hacksaw blade which hole can be utilized nicely for fastening the handle with a rivet as indicated by the words "Old Blade Hole." A new hole may be made by heating red hot locally and punching, for the second rivet. Or, make the handle large enough to entirely envelop the blade and insert two rivets, one above and one below the blade. This writer prefers the smaller handle, however, as indicated in the sketch.

To be sure, a "new" blade may be used as well as an old one where greater sharpness is wanted. But for most of the ordinary cutting jobs an old blade will do very well.



Testing for Friction

When you make adjustments on the working parts of a motor, engine, intermediate drive, or driven machine, you are often at a loss as to whether or not that adjustment has been properly made. If a bearing has been taken up a little, how can one know that he has not taken it up too much? The method that is perhaps most frequently used is to make a "temperature test." The engine or motor is operated for a short period of time after making the adjustment and it is noted whether or not the friction is excessive enough to cause the bearing to heat. The degree of heat is usually determined by the rough and ready method of touching the part, and in that way a personal element enters which varies greatly with different operators and mechanics.

A better method that can be quickly applied and that eliminates the personal element, and which has been found to give looked-for results in most cases, is to note the time required for the engine or motor to come to a standstill after turning off the power. Take the stopping time *before* making the adjustment. Then take the stopping time *after* making the adjustment. Compare the two. The greater the stopping time, the better. Make it a practice to take the stopping time every once in a while, and keep a record of it. There must, of course, be no load on the engine or motor at the time the trial is being made.

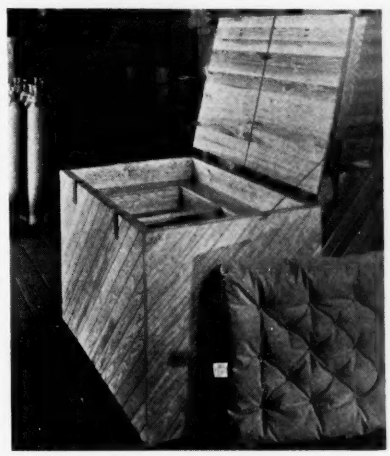
This test is possible because of the fact that all engines are equipped with flywheels, and when the engine is running at normal speed the energy stored in the flywheels has a constant value which is easy to compute mathematically. Also, rotors of electric motors possess mass and weight and consequently they do not stop instantly. The energy of a rotor, as well as that of a flywheel, varies directly as the SQUARE of the velocity, multiplied by the weight.

It is best to allow the running conditions of the engine or motor to become normal before the power is turned off. For that reason the preferred time for these friction tests is at shutting down time when the engine, motor, bearings, etc., are at normal operating temperature. Or, during the noon period.

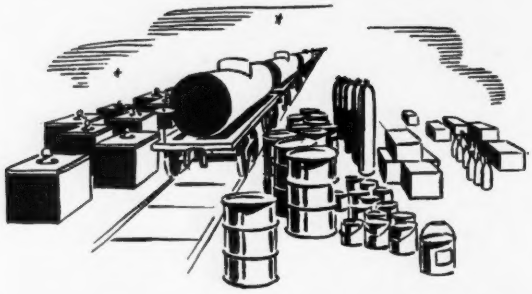
This method can be used to detect defects in an engine or drive—defects of a frictional nature. For example: If it is found that it takes fifty seconds for an engine to come to a stop on shutting down one night, and the next night the same engine stops in forty seconds, it is entirely reasonable to assume that the engine was overcoming more friction on the second day than on the first day. It should therefore be the duty of the operator to determine the cause of this increased friction which may have been due to some adjustment that was made. Or, perhaps the oiling system is defective. If the engine runs smoothly during the usual run, and on stopping the time required to stop is the same every night, the operator can rest assured that the engine (or motor) has no frictional defects. It should be the constant aim of the operator to make the time of stopping as GREAT as possible because then the friction horse power is least and the mechanical efficiency is at its maximum.

Dry Ice Storage

The Mathieson Alkali Works (Inc.), a large producer of carbon dioxide, has designed a simple storage box for dry ice. Although no curtailment in production is anticipated, delivery schedules by both rail and truck lines are restricted. Users of dry ice with adequate storage facilities will be able to order less frequently and in larger quantities, thus insuring regular supplies.



The storage box Mathieson has found to be the best type for retarding dry ice evaporation is cube shaped with a hinged top lid, tightly constructed from varnished seasoned wood, with all six surfaces lined with several inches of standard insulation, such as cork, kapok, or some equivalent material. A container, measuring about 3′ 4″ on each outside edge, with 8″ of insulation provides a 22″ cubical center space, accommodating eight standard 10″ cubes of dry ice and insuring them against excessive shrinkage. Since dry ice leaves no residue and the carbon dioxide gas that escapes as it "melts" arrests oxidation, the inside of the container does not need to be metal lined. Detailed drawings are available for this storage box. Write to Mathieson or to CHEMICAL INDUSTRIES.



PACKAGING & CONTAINER FORUM

Packaging Conference Meets in New York

A review of wartime packaging experience and discussions of what further packaging changes must be made to meet the demands of war, were the principal points of inquiry at the 14th Annual Packaging Conference held in New York City on April 13 to 16.

Sponsored by the American Management Association, the sessions were planned to inform executives concerned with packaging what are the field's principal wartime problems and how packaging has withstood the tests of war. The Conference, concentrating packaging experience from industries of a wide area, was held in conjunction with the 13th Annual Packaging Exposition, also sponsored by the American Management Association.

Pointing out that the entire supply program of the war effort depends upon the packaging, packing and shipping industries, Joseph Givner, Executive Vice President of the Real Silk Hosiery Mills, Inc., and Vice President of the American Management Association's Packaging Division, stated in announcing the Conference that it would be calculated to determine how effectively the wartime packaging job is being done.

The first session of the Conference opened on Tuesday morning, April 13, with discussions of the over-all packaging situation. Mr. Givner, the first speaker, spoke on the subject, "War has Brought Packaging Down to Earth." He was followed by Charles Sheldon, Purchasing Agent, Hood Rubber Company, Watertown, Mass., and former chief of the Container Division of the War Production Board, on "What is the Packaging and Materials Situation Today "

At a luncheon on Tuesday, Watson Davis, Director, Science Service, Inc., Washington, D. C., addressed the conference on "The Shape of Things to Come."

The Tuesday afternoon session was devoted to a series of case stories on the package conversion, under the title, "The Voice of Experience." Companies whose representatives participated in the discussion, included McCormick & Co., Baltimore, Md., Merck & Co., Tung-Sol Lamp Works, Inc., United Drug Co., and The Texas Co.

Wednesday morning, with A. W. Luhrs, Chairman, Container Coordinating Committee, War Production Board, presiding, the Conference heard papers devoted to three major wartime packaging developments: "The Packaging of Dehydrated Foods," "Technical Developments in Moisture Proofing and Protection," by Charles Southwick, and "Folding Boxes Have Gone to War," by Walton D. Lynch.

A session devoted to Washington reports on wartime packaging took place on Wednesday afternoon, April 14. The heads of various Washington agencies concerned with packaging conducted a questions and answers panel presided over by E. A. Throckmorton, Director of Sales Research, Container Corp. of America. Among the speakers were Eldo Tomiska, Deputy Chief, Containers Division, Andrew Loebl, Office of Lend Lease Administration, and Philip Kennedy, Container Division, U. S. Navy.

Both the morning and afternoon sessions on Thursday, April 16, were devoted to lectures and technical discussions on packing of general supplies.

Containers for Naval Stores

Naval stores producers were urged sometime ago by the Containers Division, WPB, to make arrangements immediately to obtain their requirements of containers other than steel drums as they need them for their 1943 production. Principal naval stores are rosin and turpentine.

As a result of a reduction of about 30 per cent in the amount of steel available for naval store drums in 1943, the industry will have to use a large number of wood barrels. paper bags, fibre drums, and tank cars. The steel saved will be used for the manufacture of war materials.

By following the advice to make arrangements immediately for their 1943 requirements of substitute containers, the industry will help relieve an expectedly heavy demand for wood and paper containers during the 1943 production season.

The Division recommended that the liquid drums be used in such manner as to obtain the maximum trips possible, with a minimum of five trips for the life of each steel drum as a goal.

Inventories of rosin drums fluctuate widely during the year, reflecting the seasonal character of rosin production. However, it is recommended that users, at the end of 1943, have no more than a 45-day inventory.

Pigment Industry Studies Cross-Haul

Intensive study of the freight transportation problem to determine the shortest hauling distances possible was urged on the industry advisory committees of the Lead Pigment, Titanium Pigment and Zinc Sulfide Pigment Manufacturers at meetings in Washington. A representative of the Transportation Section of the Chemicals Division of the War Production Board said such study would aid in adjusting shipments and eliminating excessive hauling.

Amendments on Small Containers

Recent amendments to Conservation Order M-81, governing the use of small containers for a variety of industries, have been called to the attention of paint, varnish and lacquer and other protective coatings packers by the Protective Coatings and Materials Section of the WPB Chemicals Division. The amendments provide that paints listed in Section 29 of Schedule 3 can be packed in one-gallon fibre containers with blackplate ends and one-quart fibre containers with blackplate rings and blackplate plugs, providing the plug is recovered from waste blackplate resulting from the manufacture of rings for the one-gallon containers.

A further provision limits the amount of plate which a packer can use for packing paints during 1943 to 35 per cent of the area of the plate used by such packer in 1942. The 35 per cent quota covers all cans packed by a packer during 1943 provided such cans were made from tinplate, terneplate or blackplate. If a packer has left over from 1942 quantities of cans which he purchased under his 1942 quota, such cans must be counted in his 1943 quota.

In addition, any cans made from waste or reject plate must be included in the

ver Eat RAW FISH?

U. S. Navy Life Boats now carry CANNED Fishing Tackle!

RAW FISH may not sound very palatable . . . but it can mean the difference between life and death to a shipwrecked sailor.

So the United States Navy is now equipping life boats and life rafts with *cans* containing fish hooks, lures, lines, jigs, spear and gaffs . . . to be used to catch fish to supplement emergency rations.

This emergency fishing kit is supplied not only to the Navy, but also to the U. S. Maritime Commission by the Edward K. Tryon Company of Philadelphia . . . and we're proud to say much of it is packed in Crown Cans specially designed for the job.

Cans for packing fish is an old story. Canned fishing tackle is one of the new jobs the war has brought to Crown Can!

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quota. The only exceptions from these quota restrictions are containers required by the Army, Navy, Marine Corps, Maritime Commission, War Shipping Administration or under the Lend-Lease Act.

Shipping Sack Order Revised

A revision of Conservation Order M-221, covering textile bags and paper shipping sacks, was issued by the WPB on March 30, 1943. The revised order replaces the revision of January 13. In general, restrictions with reference to bag sizes are now placed on bag manufacturers instead of bag users. Beginning May 1, paper shipping sacks and textile bags designed for packaging certain specified commodities may be made only in certain specified sizes.

New Procedure for Drum Users

Users of new steel drums have been directed to apply for authorization to purchase new steel drums or parts on Form PD-835 instead of by letter, under the terms of Conservation Order M-255, as amended March 29, 1943 by the War Production Board. The order prohibits manufacturers from selling, delivering, or using new steel drums and parts (except flanges, plugs, and cap seal) without specific authorization of W.P.B. Form PD-835 should be addressed to the Containers Division, W.P.B., Washington, D. C. Ref: M-255.

Closures for Glass Containers

Under date of March 15, Curtis E. Calder, Director General for Operations of W.P.B. issued a statement of amendment 1 to Conservation Order M-104, relating to closures for glass containers, as amended January 1, 1943. This statement continues in effect amendment 1 to M-104, in which our members are vitally interested. Relating to closures for foods and drugs, use is extended to 100% of use during the base period of 1942.

Method of Displaying Product

The International Paper Products Division of International Paper Company, Sales Agents for Bagpak, Inc. and George & Sherrard Paper Company, both subsidiaries of the parent company, have put into effect a rather unique method of showing the many specifications and characteristics of their heavy duty multiwall paper bag.

A regular size bag has been selected for the purpose: It is 17" wide with 4" gussets and 36" in length printed on both sides. The bottom of the bag has been closed by the Company's "Cushion Stitch" form of closure. At the upper right hand corner of it they have applied a staple to the gusset and the printed "copy" explains the features of a stapled gusset.

Similarly, on different sections of the bag the printed "copy" explains the virtues of such other features as pasted gussets, staggered gussets, thumb cut-outs, etc., etc. On the face of the bag attention is called to the various plies that go to make up the bag and a full explanation is given as to their qualifications.

Other interesting information from the bag buyer's viewpoint appears on both sides of the bag, which we understand is being distributed throughout the industry.

New Wrench Truck

Delivering mobile power on outdoor jobs instead of the conventional Load-handling, Type IE Unit operates as a Wrench Truck for "trapping" loaded hopper cars.

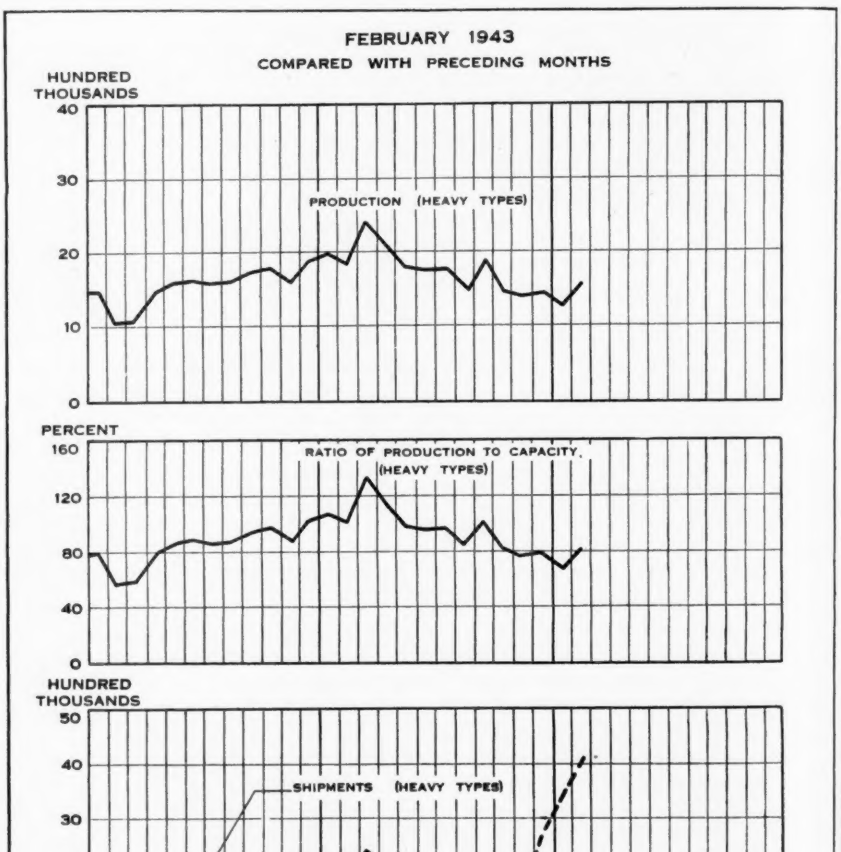
This equipment, supplied by the Elwell-Parker Electric Company is gas-electric, but can also be furnished with battery power. Travel speed up to 6 miles per hour.

When emptying cars of loose materials, the operator lines up the truck with the squared shaft projecting from side of car; raises or lowers the wrench to correct height through a motor-operated mechanism. This method shortens the process of opening the bottom gates and of winding them up again after the load has been dumped—a single truck can open and close 515 cars in one day. It also insures safety by eliminating serious injuries to men who formerly did the same work by hand.

Paper Output Is Curbed

By June the production of wood pulp for paper in the U. S. will have dropped 2,000,000 tons—from 10,500,000 tons a year to about 8,500,000. Labor is leaving the woods. Trucks and tires are scarce, and getting scarcer, there as everywhere. Seeing these facts in the wind, the WPB has trimmed the sails of the industry by ordering sweeping percentage reductions in the output of the major classes of paper.

Steel Barrel and Drum Statistics



NEW PRODUCTS AND PROCESSES

By James M. Crowe

Water-Proofing Compound

An invisible "raincoat" which can be formed on cloth, paper and many other materials by exposing them to chemical vapors from a new compound, thereby making them water-repellent, has been developed in General Electric's Research Laboratory by Dr. Winton I. Patnode.

Called Dri-Film by the G.E. Electronics Department which will market the new compound, one of its most important uses so far is the treatment of ceramic insulators for radio equipment being made for the armed forces of the United States. It is about nine times more effective than the wax used at present as a water repellent, and its results are permanent.

Dri-Film is a clear liquid composed of various chemicals which vaporize at a temperature below 100° C. Articles to be treated are exposed, in a closed cabinet, to the vapors for a few minutes. Then they are taken out and, if necessary, are exposed to ammonia vapor. This is to neutralize corrosive acids which may collect during treatment.

Dr. Patnode is not able to explain exactly what happens in the process, but the result is that an extremely thin film is formed on the surface. This "raincoat" is so thin that its structure cannot be determined by chemical analysis. It cannot be seen under a high-powered microscope. But, whatever its nature, it prevents water from spreading to form a continuous film. If moisture does collect, it is in the form of small isolated drops.

An important application of this new process is the coating of ceramic forms used in radio communications equipment where high electrical resistance between conductors is essential to successful performance. According to E. E. Williams, G.E. electronics engineer, "these ceramic insulators, when dry, provide extremely high electrical resistance. However, in service one of the adverse conditions frequently met has been condensation of moisture on the surfaces of the ceramic forms. Such condensation, if not controlled, forms a film of water and reduces the resistance between conductors to the point where excessive leakage of current results, and the performance of the equipment is impaired. Consequently, manufacturers have for years treated ceramic parts, built into this type of apparatus, with materials which to a greater or less degree reduce the effects of condensation. In the past, the best methods of treating these parts have been varnishing and waxing. Searching for a better and more effective method, Dr. Patnode developed the new and radically different treating material."

"In addition to providing a high initial surface resisting, the water-repellent treatment for ceramics must be able to withstand heat, handling, and cleaning," Mr. Williams explains. "It should not increase the tendency of the surface to accumulate dust. Dri-Film, after application, is not adversely affected by heat up to 300° C. applied for short intervals. It is not susceptible to abrasion as the result of handling during assembly of apparatus or field maintenance. Finger prints and other dirt smudges can be easily removed from Dri-Film treated ceramics with a cloth or brush moistened with solvent."

Another use for the new compound is a laboratory one. The surface of water in laboratory glassware, such as measuring cylinders and hydrometers, is ordinarily curved, low in the center, because the liquid wets the walls and tries to climb up them. Such a curved surface, or "meniscus," is prevented if the inside of the container is treated with the water-proofing vapors from Dri-Film. Then the water surface is flat and its height may be read more easily.

New Glycol-Ether

Carbide and Carbon Chemical Corporation has announced the development of ethylbutyl "Cellosolve," a new glycol-ether. The product is a colorless liquid that resembles butyl "Cellosolve" in many of its properties, but two additional carbon atoms give it greater hydrocarbon solubility and increase its boiling point to 186° C. Unlike butyl "Cellosolve," ethylbutyl "Cellosolve" is almost insoluble in water (0.45 per cent at 20° C.); the solubility of water in the solvent is 8.2 per cent at 20° C.

According to the company this new compound when used in synthetic resin lacquers, should help to produce higher gloss, a reduction of orange peel, and greater toughness of film. Ethylbutyl "Cellosolve" may also be used in hydraulic fluids, as a mutual solvent, and as a plasticizer intermediate.

Cleaner for Plastics

Turco Products, Inc., has put a new plastic cleaner on the market.

The new product called "Plexi-Glyst," is said to emulsify grease and engine spatter and cleans all plastic glass where clarity is essential, such as on bomber noses and windshields, sighting apertures, housings on navigation instruments, gas masks, goggle frames and lenses for tank drivers and welders.

The product is said to be nontoxic and safe on paint and hands. It is free-rinsing and leaves the plastic surface clear and free of greasy film which might collect dust. Plastic glasses, easily abraded by grit or sand particles, must be clarified by a specialized cleaner—many solvents must never be used. Plexi-Glyst does not cause "crazing" of stressed surfaces or infinitesimal scratches resulting in blurred images, such as those caused by some cleaning compounds not formulated especially for plastic glass.

Chemurgic Rubber

Commercial production of a new synthetic rubber using a base of domestic vegetable oils not considered suitable for edible purposes, has been under way at the Chicago plant of the Sherwin-Williams Co. for several months. Called "KemPol," the vegetable-oil rubber substitute is a development of the Sherwin-Williams research laboratory's work with "drying oils" used in paint manufacture.

Tensile strength, elongation and abrasion resistance of KemPol are not on a par with those of natural rubber, although in many other properties it compares so favorably with natural rubber as to enable its use in many products such as treads, mats, pads, erasers, gaskets, braided hose, etc. Since no toxic raw materials are used in its manufacture, it may be used for such other products as jar rings and various types of seals for food containers.

KemPol lends itself readily to emulsification and with certain limitations, to solutions, so that a number of successful applications in the field of fabric coating, tapes, adhesives and sealing compounds have resulted. KemPol sponges easily, offering many possibilities in that field.

The new product is said to show considerable promise as an extender for natural, reclaimed, and the Buna and Butyl rubbers, with all of which it is readily compatible.

Fireproof Sweeping Compound

Fibre-Tex is the name of a new fireproof cleaning compound.

The product is said not to burn from direct contact with flame, nor as the result of spontaneous combustion.

It is also claimed that it is highly absorbent of oils and grease and has an active cleaning effect upon floors on which it is consistently applied. Grease and oil-caked dirt are said to be removed; safety stripes and other floor markings made plainer and, in general, plant housekeeping greatly improved.

Its use is indicated in industrial plants generally, as well as garages, service stations, oil plants, airports or wherever machinery is serviced or oil or grease may collect or be spilled upon floors.

INDUSTRY'S BOOKSHELF

Organic Reactions, Volume I, by Roger Adams, Editor in Chief, assisted by W. E. Bachmann, L. F. Fieser, J. R. Johnson, and H. R. Snyder. Published by John Wiley and Sons, N. Y.; 391 pp., $4.00.

FIRST OF A SERIES of volumes that is to appear on "Organic Reactions," this is a collection of twelve chapters written by those who have had experience with the reactions described. All of the reactions are very important ones in the field of organic chemistry and as stated in the preface, "The subjects are presented from the preparative viewpoint, and particular attention is given to limitations, interfering influences, effects of structure, and the selection of experimental techniques." Under each reaction there are several procedures to illustrate modifications of the methods. The tables given with the reactions are very complete and well arranged. The bibliography in each case is very extensive.

This first volume will be received by chemists with considerable delight as it gives an enormous amount of information collected under one cover. The reactions discussed are: (1) The Reformatsky Reaction; (2) The Arndt-Eistert Synthesis; (3) Chloromethylation of Aromatic Compounds; (4) The Amination of Heterocyclic Bases by Alkali Amides; (5) The Bucherer Reaction; (6) The Elbs Reaction; (7) The Clemmensen Reduction; (8) The Perkin Reaction and Related Reactions; (9) The Acetoacetic Ester Condensation and Certain Related Reactions; (10) The Mannich Reaction; (11) The Fries Reaction; (12) The Jacobsen Reaction.

The contents of the chapters are well outlined and the material easy to read. The procedures are excellently described. If the succeeding volumes are as good as this first one—and there is reason to believe that they will be—we will have at our command an invaluable set of works on organic chemistry.

L. McMaster
Professor of Chemistry
Washington University.

Noxious Gases, A. C. S. Monograph No. 35, by Yandell Henderson and Howard W. Haggard, Reinhold Publishing Corp., N. Y.; revised edition, 294 pp., $3.50.

REVISED EDITION of the publication of the same title that appeared in 1927, the format of the new book is similar with an introductory section on the laws of physical and physiological chemistry and their application to the gaseous exchange in the respiratory system.

The gases which occur most often in industry are classified according to the general nature of their physiological action. Each group is discussed in general with individual attention given to the important members. This prevents the edition from being a mere compendium of experimental data on isolated compounds. It is unfortunate that the physiology of the agents important from the manufacturing as well as tactical use in chemical warfare were not discussed. References dealing with these compounds are listed, however.

The addition of new standards of allowable concentrations for gases in industry and the inclusion of the results of the most recent toxicological work in this field enhance the value of this edition. It will continue to serve not only as a scholarly treatise on the physiology of inspired gases but also as a reference work for the industrial physician and industrial hygiene engineer. Along with summarizing our present knowledge on the physiology of atmospheric contaminations it spotlights the necessity for more knowledge on this expanding frontier of industrial medicine.

R. Emmet Kelly
Captain, Medical Corps
U. S. Army.

Introduction to the Microtechnique of Inorganic Analysis, by A. A. Benedetti-Pichler, John Wiley & Sons, N. Y.; 302 pp., $3.50.

PRINCIPLES OF MICROTECHNIQUE of qualitative and quantitative analysis are given in considerable detail by this book which replaces the "Introduction to the Microtechnique of Inorganic Qualitative Analysis" by A. A. Benedetti and W. F. Spikes. The special apparatus necessary and the methods of using it are also described rather fully. Part I deals with apparatus for general use; Part II discusses qualitative analysis using spot tests, slide tests, fiber tests, test-tube tests and bead tests, and also the microtechnique of qualitative analysis. This latter is divided under the headings of centigram, milligram and gamma procedures. Part III classes centigram and milligram procedures together in describing gravimetric determinations. Gamma gravimetric determinations being very limited due to the necessity of extremely exact conditions are but briefly touched upon. A discussion of titrimetric methods at some length completes the book except for a useful appendix containing a bibliography, brief suggestions for a basic course in microtechnique, and lists of required apparatus and reagents.

Primarily written as a textbook for students, this volume is a useful guide to experienced "macrochemists" who desire to make use of these more recently devised methods. It cannot, however, be too greatly emphasized that in general, although the reactions involved are usually identical with those employed in macro methods, the technique involved is quite different and requires considerable experience and also a separate meticulously clean laboratory free from dust, vibrations and fumes, and the use of far more delicate and smaller apparatus. The actual examples given by the author are simply examples of particular procedures. Consequently most actual determinations must be thought out by the reader, normally applying reactions employed in macro methods, to microtechnique. It is stressed that a good, even inexpensive, analytical balance may be used for centigram and milligram gravimetric procedures. Qualitative spot and slide tests bridge the gap between macro and micro methods. This book encourages within the reader the hope that these border line methods may at some future date be placed on a sound quantitative basis so that chemists who have not time to acquire the special microtechnique may reap the benefit of its niceties.

Frank M. Biffin
Foster D. Snell, Inc.

Organic Chemistry, by Paul Karrer, translated from latest German edition by A. J. Mee, M.A., B.Sc., Nordeman Publishing Co., N. Y., 1938, xx, 902 pp., illus., diagrs., 8°; $11.00.

THE PRESENT VOLUME is intended for the instruction of college students. This first English translation of Lehrbuch der Organischen Chemie is based on the fifth German edition, but incorporates corrections and additions for the sixth German edition.

To make the problems of organic chemistry more easily understood and the subject more real and alive, special attention has been paid in all chapters to the description of methods of synthesis and of determining the constitution of organic compounds. Methods of producing the majority of these compounds, and proofs of their constitution and configuration are thoroughly discussed. Included in the discussion are many problems of stereochemistry.

The book emphasizes biochemical compounds and the chemistry of naturally occurring materials. A large number of appended tables embody both scientific and statistical material.

T. E. R. Singer,
New York, N. Y.

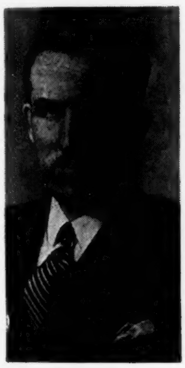
CANADIAN REVIEW

By Kenneth R. Wilson

OTTAWA—The common thread of war problems in United States and Canada was made very clear when I attended a special meeting of the National Conference of Business Paper Editors at Washington last month.

At this conference, business paper editors and publishers sat in with Donald Nelson, Prentiss Brown, General Somervell, Col. Robert Johnson (Smaller War Plants Corporation) and other U. S. war leaders and plied them with questions about current problems. There was the frankest exchange of views and much valuable light thrown on present and future policy.

The shape of things to come (on both sides of the 49th parallel) was indicated by the intimation that plans are underway for blueprinting the "progressive conversion" of industries at present or shortly to be faced with curtailment of war orders. Mentioned especially were the building and construction trades, the machine tool industry and firms now directly or indirectly connected with supply of materials and equipment for the land army.



K. R. Wilson

Meetings are to be held with business leaders to blueprint the "progressive conversion" believed necessary if wastage of manpower and plant facilities is to be cut to a minimum. This does not mean that the war has been won or that the overall demand for war material will not continue to increase. It does mean that the war has now reached a stage where there will be increasingly rapid changes in demand—changes which will throw thousands of men out of work until such time as a new outlet for their skill and brawn can be found.

What Washington officials urge, is the need for an effective liaison between management and war leaders so that this inevitable dislocation can be cut to the minimum.

One probable result of this shift in objectives may be to increase the production of many items now being urgently required to maintain the "home" front.

Canadian war production is more vulnerable than that of the United States because our output of land equipment is more specialized. Also much of Canadian production has been in types of equipment where the stockpiles are now greatest. This is natural in view of the longer production record of most Canadian war plants. Within recent weeks, Canada has had very important "cancellations" of big contracts which have only in part been offset by increased demand for escort vessels, and other war items which continue in urgent and critical demand.

In Canada, two very practical difficulties have been faced which have so far hampered "conversion." These are:

(1) inability to obtain material with which to manufacture "peacetime" lines.

(2) the business "freezing" order of the Wartime Prices & Trade Board which prevents any firm or distributor from going into any new production or merchandise without a special "permit."

It is an anomaly that such discussions should be going on in countries where there is a critical overall shortage of manpower for the "services" and for primary industry such as farming and woods operation. Yet what apparently looms ahead is an increasing problem of local and industrial "unemployment" which will require the most careful planning and forethought if wastage of both manpower and plant facilities is to be avoided.

Meanwhile it seems clear that the deliberate curtailment of civilian production for reasons of releasing manpower, has bogged down in both countries. Admittedly there will be continued "automatic" retrenchment in civilian production in various lines by reason of individual shortages of material, supplies, power, manpower, etc. But neither United States or Canada is as yet prepared to move deliberately to close down civilian industry in order to release manpower for the armed forces or for agriculture.

Farm Manpower

So far, the United States has not taken the obvious and essential step which Canada took a year ago of "freezing" manpower on the farms. Both countries quite obviously face their most acute manpower shortage for 1943 in terms of insufficient farm labor. In the U. S. the manpower drain from farms still continues. In Canada, the drain has been largely checked but it is now the more difficult problem of getting men back on to farms once they have gone into war industry or the services.

Some important suggestions were made at Washington in discussion of plans and policy for the Smaller War Plants Corporation, headed by Col. Robert Johnson.

It was indicated that efforts to distribute war work by this means would be done by decentralization through industrial regions, rather than from Washington. Once possibilities for direct orders to small or "distressed" plants either from the chief procurement agencies or from big prime contractors were exhausted, the suggestion was made that retail buyers would be encouraged to sit down with business and pool their ingenuity to devise products which could use non-critical material and fill up emptying retail shelves.

Small Business a Problem

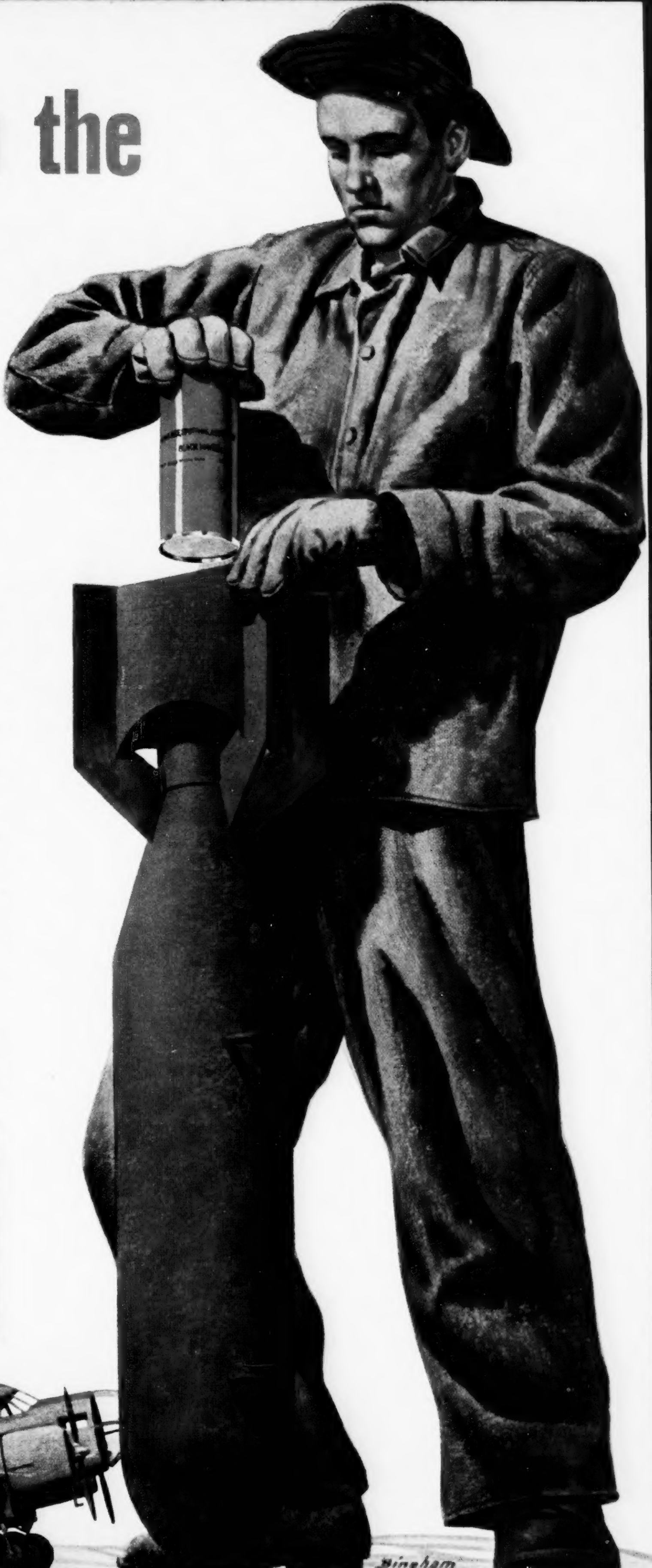
As Canada has found increasingly in the past three or four months, this problem of small business becomes more important as certain types of war orders disappear. Naturally, prime contractors tend to withdraw sub-contracts so as to keep their own facilities as fully-occupied as possible. It is the small business which takes the rap.

Price control authorities both at Washington and Ottawa are pessimistic about the prospect of maintaining price-wage controls at their present levels. It is, of course, openly admitted in Washington that the very best that can be hoped for in the U. S. is to keep prices within ½ per cent per month of present levels, and that the passage of the Bankhead and the Pace Bills, or the granting of a $2 wage increase as demanded by John Lewis, would be fatal to present U. S. controls.

For the moment Canada's price control machinery is in the embarrassing position of having to worry about too great a *drop* in the cost of living. Because Canada subsidized certain consumer goods (oranges, tea, milk and coffee) in order to remove pressure on the price ceiling, the index has been momentarily declining rather than increasing. If it goes down much further it means that Canadian wage-earners will have to forfeit part of the cost-of-living wage bonus—an event which would be highly embarrassing (politically) to the government when labor is generally restive against the ceiling on "basic" wage rates. Strong dislike at Washington for trade or consumer subsidies makes such an occurrence in the U. S. an impossibility.

Apart from this unusual circumstance there is an overhanging doubt at Ottawa of Canada's ability to hold her present price and wage ceiling policy in light of the virtual certainty of continued rise in prices and wages in the U. S.

The bomb with the tattle-tale can



You watch a soldier ram a "tin can" (of all things) into the tail of a bomb. You wonder: "What's that for?"

Bombs used for training our bombardiers contain sand instead of high explosive. Yet every practice bomb dropped must "explode" to show observers the hit.

The can holds five pounds of black powder. When the bomb lands, the powder explodes with a puff of smoke. The hit is recorded by aerial camera. What the cadet bombardier learns from it will some day mean trouble for an Axis target.

You know, of course, why this powder for the Army is packed in cans. Wet powder's no good. Like food, oil, and ammunition, it must be completely protected.

Metal containers "can take it." They don't break, chip or tear. They protect against light, heat, dirt, moisture, insects. They get there—*safe*.

That's why millions upon millions of cans are going to war. That's why you can't get all the things you used to in America's favorite container.

The can will come home some day—better than you've ever known, thanks to our job as packaging headquarters for Johnny Doughboy & Co.

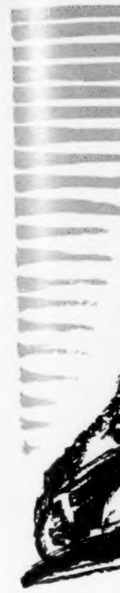
NEED HELP ON WAR WORK?

Metal containers are delivering the goods safely—foods, supplies, and bullets arrive ready for action. Continental is making millions of these cans along with other war needs, including plane parts.

Yet, rushed as we are, we can still take on more! Right now, a part of our vast metal-working facilities for forming, stamping, machining and assembly is still available. Write or phone our War Products Council, 100 East 42nd St., New York.

CONTINENTAL CAN COMPANY

HELP CAN THE AXIS—BUY WAR BONDS



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Stauffer supplies the American farmer with many essential chemicals to combat insects, fungi, and other pests that ruin millions of tons of crops that would otherwise help supply our war and home fronts.

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(* Items marked with star are sold on West Coast only)

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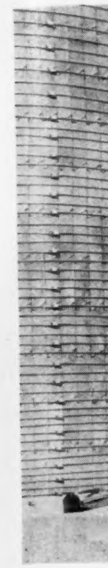
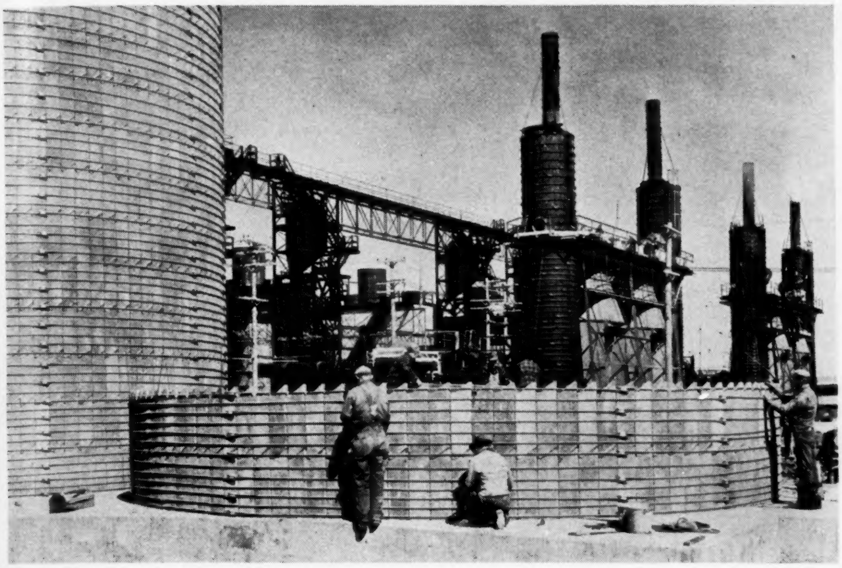
Six

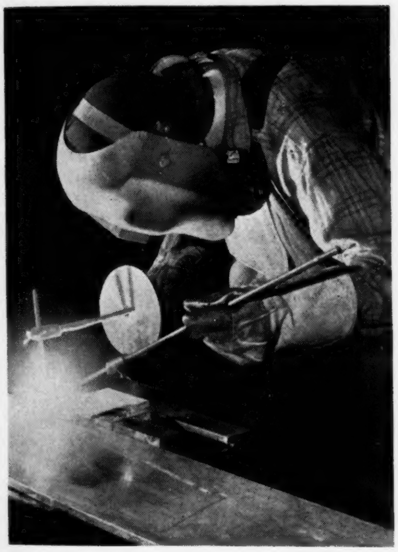


April, '4

Sixth Dow Magnesium Plant in Operation

Uses Bus Bars of Solid Silver

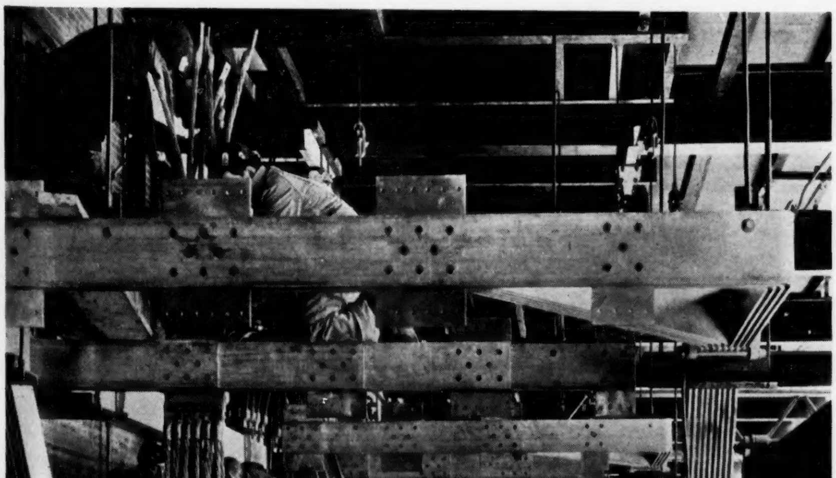




Above. *Magnesium chloride produced from salt brines at a companion plant several hundred miles across the state is stored in massive concrete bins like those shown under construction. Conveyors distribute this feed to the cells, some of which can be seen in the background, center. Several HCl absorbers are shown on the right.*

Left. *A welder working on a section of solid silver bus bar.*

Below. *Silver bus bars, which have been used throughout the plant to carry power to the cells, form a virtual canopy over the cell room.*



FIRST metal from the sixth and largest magnesium plant operated by Dow Magnesium Corp. was poured April 8 as Washington officials representing the Defense Plant Corp. and War Production Board looked on. Located in eastern Michigan, the $40,000,000 plant marks the climax of the government's war production program of 600,000,000 lbs. of magnesium a year. It is expected to be in full operation in two or three months.

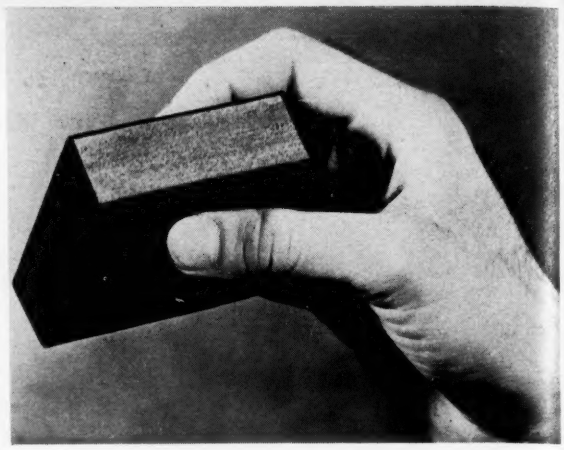
A unique wartime feature of the new plant, which operates on the usual Dow process of electrolysis of magnesium chloride, is the 900 tons of solid silver bus bars which almost completely replace copper for the large scale distribution of electric power to the cells. The silver was loaned by the government to Defense Plant Corp., owner of the plant, in order to release copper for shells, ordnance equipment and other war needs for which substitutes are less satisfactory.

In the Dow electrolytic process, dry magnesium chloride is introduced into electrolytic cells and subjected to about 600 volts of electricity, giving chlorine and metallic magnesium. Buildings at the new plant include eight cell-block structures, electricity rectification plants, acid plants, power-house, office building and alloy buildings. Construction is being handled by the Austin Company.

The start of magnesium production at this plant anticipates the early beginning of operations at Dow Magnesium's companion plant across the state which will produce magnesium chloride from subterranean salt brine. This "cell feed," a light granular material of about 85% $MgCl_2$ and 15% water, will be produced by a rather complicated process of precipitation, filtration, crystallization and chemical separation. Magnesium chloride concentration in the regional brine is about 10%. The finished cell feed will be transported across the state in closed hopper railroad cars to the eastern plant, which was so located because of the availability of power.

Substitutes to the Fore

Faced with many shortages in formerly plentiful materials, industry during the past two years has exercised its ingenuity and solved its problems with substitutes, many of which are proving better than the formerly used products. On this page several recently announced products are shown.

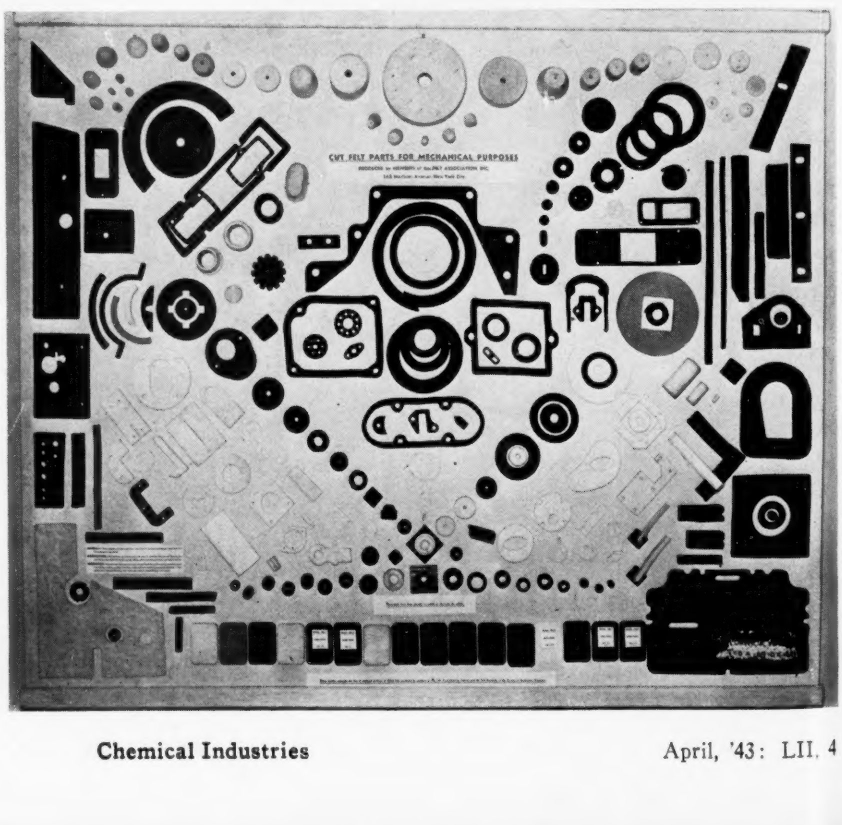


At the right, a sponge rubber gasket covered with a smooth coating of natural rubber or Ameripol synthetic rubber by the extrusion process by The B. F. Goodrich Company.

The new type gaskets are now being used only in products of war, mainly airplanes and tanks, where they are proving their value as a sealing member in severe service.

Below, William J. Walton, research chemist in charge of KemPol production for Sherwin-Williams, examines a section of the newly developed vegetable-oil rubber substitute.

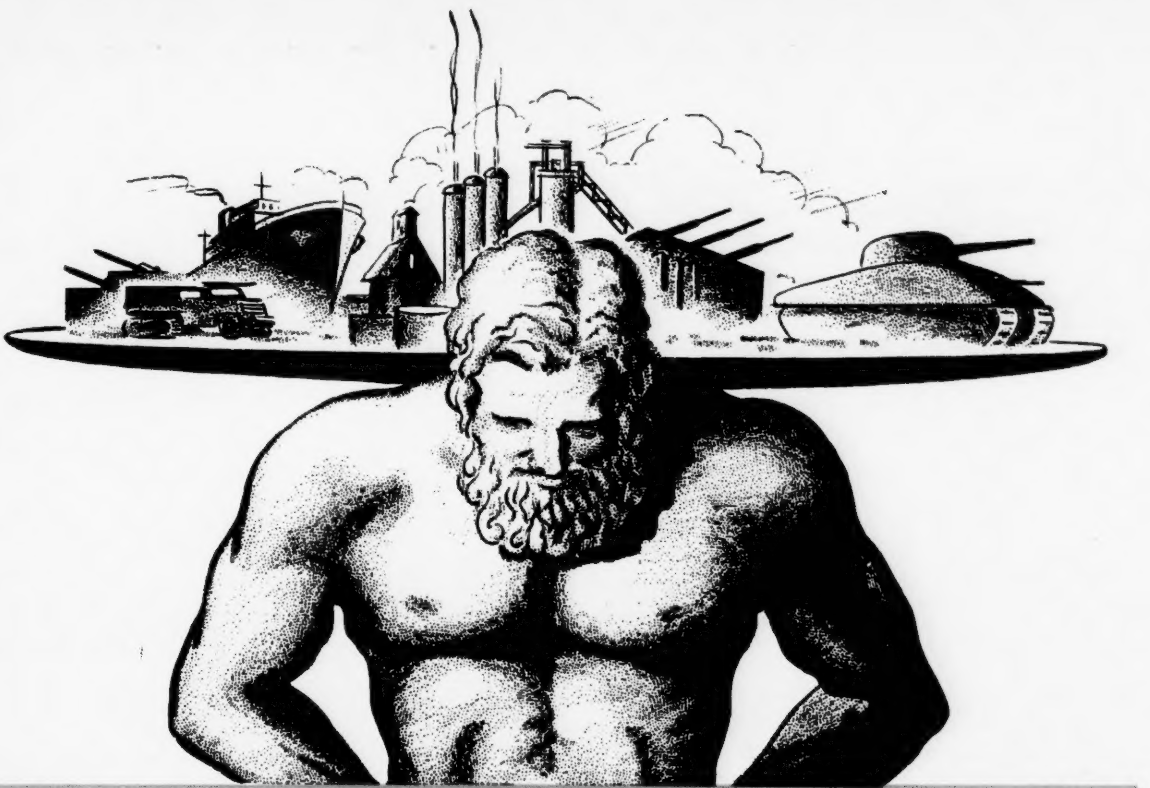
Below. Faced with the possible shortage of material formerly used in manufacturing bases for high frequency radio tubes for military commmunication equipment, Heintz & Kaufman, Ltd. adopted a ceramic plastic, Prestite, developed by Westinghouse.



Right. Wool felt is proving to be a worthy pinch-hitter for vitally needed rubber. Increasing quantities of wool felt are used for the manufacture of washers, gaskets, and a variety of intricate parts formerly produced from rubber.

Approximately 500,000 pounds of rubber have been conserved in this way during the past six months for vital war production where no replacement is possible, the Conservation Division of WPB has announced.

This OWI photograph shows a wool felt exhibit illustrating the many forms used in machinery as a substitute for rubber.

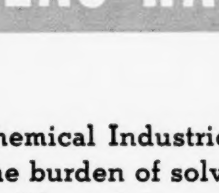


A MODERN ATLAS HASTENS VICTORY

On the shoulders of the Chemical Industries—modern Atlas in this War of Production—rests much of the burden of solving the equation for Victory. For Chemistry must create, simplify and hasten many processes necessary for improved quality and larger tonnage of steel, explosives, rubber and kindred weapons.

Before the United States entered the war, Sharples had devoted its energies to the synthesis of organic chemicals for normal peacetime applications. Our entry into the war immediately concentrated the entire production and research facilities of Sharples on those chemicals most needed by critical industries supplying our armed forces. Today it is a short jump from the test tube to the battlefield, and Sharples is doing its share to further shorten this jump and increase the chemical "fire-power" of the United Nations.

We are proud to help "modern Atlas" carry the burden that is inevitably hastening victory—and paving the way for the newer and greater industries of tomorrow.



SHARPLES TRADE MARK CHEMICALS

ARMY E NAVY

SHARPLES CHEMICALS INC.

PHILADELPHIA CHICAGO NEW YORK

War-Time Changes in Packaging

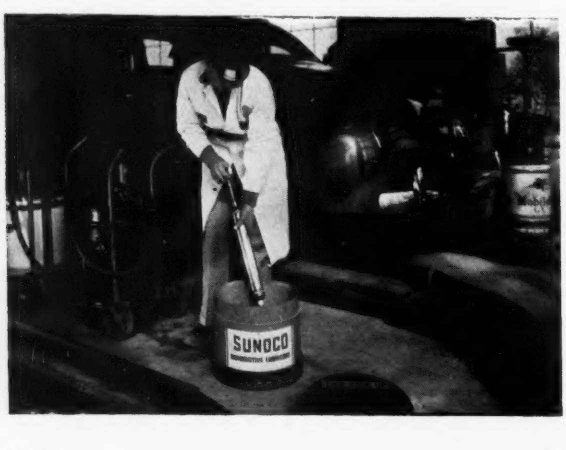
Reflected by winners in All-America Package Competition

Selections of the judges in America's first wartime package competition sponsored by *Modern Packaging* Magazine, furnish a cross-sectional review of our first year at war. Such outstanding developments as a metal substitute made of paper, lead foil and asphalt; new consumer powder boxes, compacts and lipsticks of paper; a paper package in which processed meats are actually cooked; and 30 other awards were recently announced.

Right. The restrictions on metal for packaging purposes have had far-reaching effects. Many containers for many different types of products have been affected and the adaptations made have been many and varied. One of the products affected by this order is gum turpentine. Like many liquid products, this one seemed to fit best in glass. Conforming to Government restrictions on standardization and simplification, a stock mold Boston round bottle was chosen as the new container. The bottles are filled in three different sizes, with the advertising and use messages printed directly on the glass in white ink.
These bottles used by Turpentine and Rosin Factors, Inc. were designed by Owens-Illinois Glass Co.

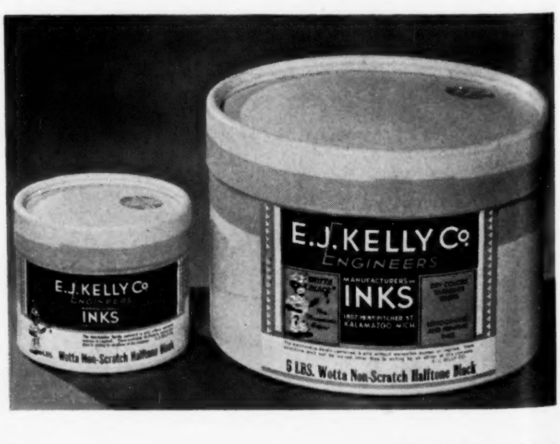
Below. Formerly packaged in a steel drum containing 60 pounds, each Standard Brands Inc., Liquid Diamalt is now packed in 30 pound lots in sealed, specially coated cloth bags inside of heavyweight corrugated cartons.
The new package costs about the same as the former steel container. A special flap arrangement makes it easy to pour the liquid from the bag without removing it from the carton.

An effect of the W. P. B. Order L-197, prohibiting the use of steel containers in packaging certain products, is the development of a fibreboard grease drum by the Sun Oil Company.



Below. A unique packaging material, developed by the Reynolds Metals Co., for direct military uses, known as Renlflex, was given the honor of a Special Award by the judges of the 12th Annual All-America Package Competition.

Another of the outstanding adjustments to WPB Conservation Order M-81 is the spiral-wound Sealright paper can in which E. J. Kelly Company markets their printing inks and other products.



ELECTRONICS creates a wonder world!

...how Chemical Purity contributes to this new miracle of science

Electronics—the new science of putting the electron to work!

Today, the electron tube guides the destinies of armies and fleets all over the world.

Tomorrow—this miracle-working tube which sees, hears, tastes, feels and smells with amazing sensitivity—will revolutionize our peace-time lives.

It will invade industry in all its aspects, save energy, save time, save money, protect life and property.

Baker is playing its part in contributing chemicals of extraordinary purity to make possible the coating of the filament used in the electron tube. Here, *purity is demanded*—so that transmission of electronic power may not be impeded.

This is only one of many instances where *purity*, as exemplified by Baker Chemicals, has increased efficiency in today's forward march of industry.

Baker's Chemicals (purity by the ton) have been supplied to many manufacturing concerns for the manufacture or processing of many products.

If you have special chemical requirements for war-production products, we invite you to discuss your needs in confidence with Baker.

J. T. Baker Chemical Co., ***Executive Offices and Plant:*** **Phillipsburg, N. J.**
Branch Offices: **New York, Philadelphia and Chicago.**

FOR VICTORY
BUY
UNITED STATES
WAR
BONDS
AND
STAMPS

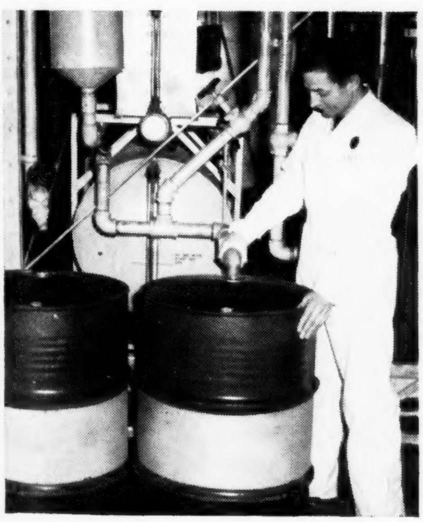
Baker's Chemicals

C. P. ANALYZED · FINE · INDUSTRIAL

A 42½-ton Pan American Clipper being serviced with gas and oil in Tri-Sure-equipped drums, before flying with vital war equipment to Africa.

AFRICA BOUND!

This vital air service demands big, fast powerful planes — and gas and oil that are protected by Tri-Sure Closures



No chances can be taken with a Clipper's oil supply. Drums are sealed with leak-proof, tamper-proof Tri-Sure Closures.

Photographs courtesy Pan American Airways

Africa bound! These giant Pan American Clippers are a symbol of America's pre-eminence in the air, as they speed war-vital men and materials across the ocean, and help to maintain one of America's most important aerial lifelines.

On this gigantic ferry service the precious fuel, on which depends so much the safe carriage of human lives and war materials, is safeguarded by Tri-Sure's perfected seal, plug and flange.

Tri-Sure

Reg. U. S. Pat. Off.

CLOSURES

AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK, N. Y.
TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

Tri-Sure News

NUMBER 4 ★ 30 ROCKEFELLER PLAZA, NEW YORK, NEW YORK ★ APRIL, 1943

NEWS OF THE MONTH

GENERAL

A.C.S. Holds Spring Meeting

The 1943 spring meeting of the American Chemical Society held in Detroit, April 12 to 16, was a war meeting. With plant trips and organized entertainment eliminated, emphasis was placed on technical sessions and opportunities for conferences and group discussions. The special symposia presented during five full conference days aimed at furthering the successful prosecution of the war.

More than 4,000 scientists and industrialists participated. Several hundred papers and addresses outlining progress in the nation's research laboratories and on the production front were presented before the Society's professional divisions. Fields in which activity in support of the war effort were described include synthetic rubber, petroleum, malaria, agriculture and food, industrial water supplies, civilian preparedness for chemical warfare, gas and fuel, chemical education, and sugar chemistry and technology. On display were thousands of vested chemical patents formerly owned by enemy nationals, but now under the control of the Alien Property Custodian.

Contributions of the industries to the war were outlined by E. V. Murphree, Standard Oil Development Co., "The Petroleum Industry in the War Effort"; C. A. Thomas, Monsanto Chemical Co., "The Chemical Industry in the War Effort"; C. F. Kettering, General Motors Corp., "The Automotive Industry in the War Effort."

Wartime advances in rubber were reported to Division of Rubber Chemistry on April 15 and 16. In a paper entitled "Thirty Years of Contributions to the Science of Synthetic Rubber," W. L. Semon described the progress of research and development in this field, and discussed what the future may bring as result of outstanding achievements already recorded.

Chemists from research institutes and universities, working on synthetic antimalarials under the supervision of National Research Council and Medical Research Committee, Office of Scientific Research and Development participated in the symposium on malaria. Eight papers reviewed the progress in the search for antimalarial drugs as substitutes for the captured quinine supply. Among these A. E. Sherndal spoke on "The Chemistry and Development of Atabrine and Plasmoquin" and Lyndon F. Small on "Antimalarials Other than Atabrine and Plasmoquin."

Symposium on Civilian Preparedness for Chemical Warfare included addresses by T. D. Stewart describing "Role of the Chemist in Chemical Warfare and Civilian Defense," A. Gibson on "Chemical Warfare Agents. Their Possible and Probable Use by the Enemy and the Implications for Civilian Defense," and M. B. Jacobs, "Protection of Food against Chemical Attack."

Selective Service

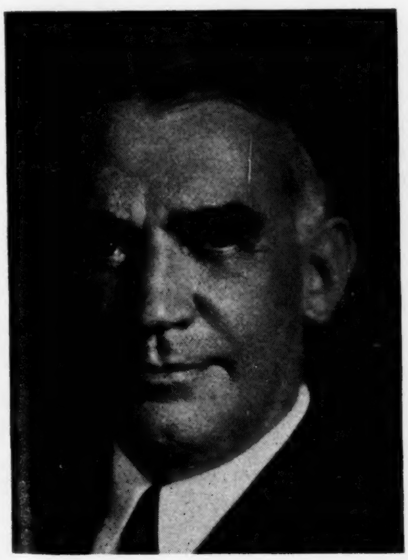
Broad liberalization of deferment policies for college students has been announced by the Selective Service Bureau of the War Manpower Commission. Materially affected by the revised policy are undergraduate students and graduate students in scientific and specialized fields, including chemists and chemical engineers.

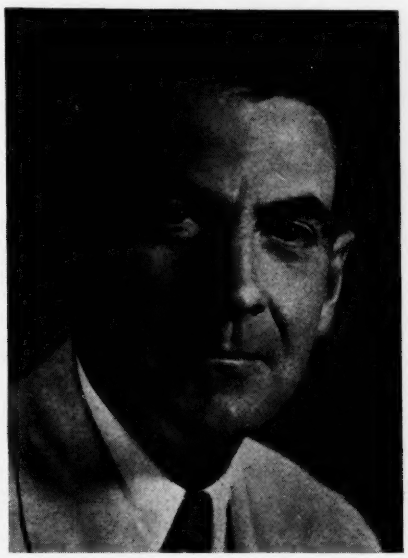
With respect to undergraduate students in the scientific and specialized fields, Selective Service, in amended Occupational Bulletin No. 10, said:

"A student in undergraduate work in any of the scientific and specialized fields listed should be considered for occupational classification if he is a full-time student in good standing in a recognized college or university and if it is certified by the institution as follows: (1) That he is competent and gives promise of successful completion of such course of study, and (2) that if he continues his progress he will graduate from such course of study on or before July 1, 1945."

A graduate or postgraduate student undertaking further study in the scientific and specialized fields following completion of his normal undergraduate course of study should be considered for occupational classification, the occupational bulletin said, if, in addition to pursuing further studies, he is also acting as a graduate assistant in a recognized college or university.

Monsanto Elects New President





Charles Belknap (left), chairman of executive committee and executive vice president of Monsanto was elected president. Edgar Monsanto Queeny, for fifteen years president, was elected chairman of the board.

Women Chemists Feature Meeting

Reports on the work women are doing in chemistry were featured at 105th meeting of the American Chemical Society.

Dr. Icie Macy-Hoobler, director of the research laboratory of the Children's Fund of Michigan, pointed out that the women chemists to be represented did not assume their positions as a result of the wartime shortage in their field.

"They are all well trained and qualified to hold their jobs," she said. "All have Ph.D. degrees or the equivalent necessary in their field. They cannot be classified with those in the last war who 'had courses in chemistry' and withdrew at the end of the war with the return of the demobilized chemist."

Fifty-two per cent of the papers to be presented by women are in the field of biological chemistry, 17% each in chemical education and organic chemistry, 3% in agricultural and food chemistry and 1% in water, sewage and sanitation chemistry.

WPB Appoints

Samuel H. Manian, formerly with Dept. of Chemical Engineering, Univ. of Cincinnati, is now staff member of Associated Materials Unit, Protective Coatings and Materials Section, WPB.

Robert F. Brown has resigned his posi-

tion as research chemist with Procter and Gamble to accept an appointment as industrial specialist with Fats and Oil Section, Chemical Branch, WPB.

Alien Books and Patents

"Libraries" of copies of vested patents opened March 29, at Alien Property Custodian offices, 120 Broadway, New York City, and Field Building, Chicago. These "libraries" contain all the patents vested from enemy and other aliens, arranged for ready reference and also catalogued in classified order. Vested applications are also open to public inspection as rapidly as they become available..

Interested manufacturers, attorneys and others will be assisted in ordering copies of patents and given full information on securing licenses. The "library" hours are 9-5 daily, including Saturdays. Some idea of the quantity of available patents is reflected in the 75 feet of shelf space they occupy. Virtually every Patent Office classification is represented and many manufacturers have already received licenses to use some of these patents and patent applications.

According to another announcement of Alien Property Custodian four hundred titles of individual technical books and sets of books of Axis origin are available for publication in furtherance of the war effort. Suggested by leading American scientists and librarians, they included volumes on aviation, medicine, gas warfare, oceanography, physics, chemistry and other technical subjects.

Copyright interests in these works will be vested for the purpose of having them republished as an aid to scientific research allied with the war effort. The Custodian will seek reproduction and distribution of such works through normal publishing channels by American publishers under licenses to be granted on May first. To encourage immediate republication and assure the widest possible use of scientific works, licenses will be granted on a non-exclusive basis for a five-year period. They will be royalty-free until all original costs incidental to republication have been recovered and then will bear a royalty of fifteen per cent. of the list price of the works.

Chemists Hold NLRB Election

In NLRB election held December 21, the Permanente Magnesium laboratory at Los Altos, reports *Vortex*, selected Federation of Architects, Engineers, Chemists and Technicians (CIO) as their bargaining agent by a 5 to 1 vote. Fifty-three research and control chemists and their associates voted and of these 44 cast their ballots in favor of FAECT. Forty-two of these were professionals, chemists, metallurgists, radiographers, analysts and junior chemists engaged in research and control work at Kaiser's Magnesium plant.

NLRB election was ordered after FAECT requested recognition of the laboratory staff as a separate bargaining unit, but this was opposed by the company and AFL. They both maintained that a master contract negotiated in September, 1941, before the plant was open, covered all employees. The NLRB ruled that the master contract was no bar to an election since it specifically excluded . . . engineers, chemists and other professional personnel.

North Africa Loss Threatens Axis Food Supply

If the United Nations capture and hold North Africa and its phosphate deposits, Germany's most important source of this vital soil fertilizer will be gone and its food supply reduced even beyond present low levels, Felix N. Williams, production manager of Monsanto Chemical Company's Phosphate Division, said in a recent speech. The Axis powers then would have only 15% of the world's supply, he reported.

"North Africa is the largest and richest source of Axis controlled phosphate deposits. Italy and Germany in their own countries have none and the amounts Japan can obtain from the islands of Ocean, Mauru, Christmas and the Dutch Indies, is comparatively negligible," Williams pointed out.

Citing the great importance of phosphate fertilizer in those countries, he said, "Intensive farming has been practiced for many years by many European countries, and, as farmers know, this means greater care must be taken in balancing fertilization of soil. Particularly during these Nazi days, Germany has no time to allow land to remain fallow or to plow in soil-rejuvenating crops. Consequently, plant foods must be returned chemically as they are depleted.

A.S.T.M. Publications

Latest compilation of all A. S. T. M. standards on rubber products (as of Feb., 1943) includes 41 specifications, physical and chemical tests for wide range of rubber products, and emergency alternate provisions and other emergency methods issued to expedite procurement and conserve crude rubber. Committee D-11 on Rubber Products, responsible for the book, has developed a number of widely used test procedures such as methods of chemical analysis (27 pp.), tension testing, accelerated aging, resistance to light checking and cracking, adhesion, compression, ply separation, and changes in liquids.

"INDEX to A.S.T.M. STANDARDS, including Tentative Standards," as of Dec. 1942, is also available. The 1100 standards, specifications, and tests in 1942 Book of Standards can be located by using the index.

Joins OPA

J. J. Toohy, formerly with E. R. Squibb, has been appointed chief of Chemicals and Drugs Price Branch, OPA.

Johns Hopkins Teaching Use of Industry Controls

Automatic control of industrial processes is such an important factor in the war production program that Johns Hopkins University, noted scientific and medical center, has established a special course to train technicians in the use of industrial instruments and controls.

Brown Instrument division of Minneapolis-Honeywell Regulator Co. is cooperating in the educational program by assigning as guest lecturers, members of its Philadelphia technical staff. They will explain the working of such instruments as the recently developed electronic potentiometer, the Radiamatic pyrometer and air-operated process controls.

New Electro-development Lab.

Albany, Oregon, has been selected as site for the Northwest electro-development laboratory where Bureau of Mines metallurgists will study recovery and processing of minerals from Pacific Northwest as part of a program to utilize this region's vast resources in winning the war.

Negotiations have been completed for purchase of vacated buildings and grounds of Lewis and Clark College, an institution that moved to Portland a few years ago, and Bureau of Mines soon will begin converting the property into a laboratory.

Clark Heads Anti-Trust Work

Tom C. Clark of Dallas, Texas, was nominated by President Roosevelt to be an assistant Attorney General, succeeding Thurman Arnold, in charge of the Department of Justice's anti-trust activities.

Mr. Arnold recently was named a judge of the United States Court of Appeals for the District of Columbia.

Stop Off-the-Job Accidents

National Safety Council has launched the most ambitious campaign against off-the-job accidents in the history of the safety movement. Col. John Stilwell, president of the Council, pointed out that work accidents in the United States have been cut 70 per cent in the past 20 years in industrial organizations that consistently have used proved safety techniques. In 1942 a total of 29,000 workers met death in off-the-job accidents, as compared with 18,500 killed at work. Of 4,100,000 non-fatal injuries to workers, 2,350,000 occurred off-the-job.

As part of the campaign, the Council has produced a series of new publications and films aimed specifically at off-the-job accidents, but based on techniques and methods that have proved effective through the years in preventing accidents in industrial plants.

Reid Leaves WPB

Dr. Ernest W. Reid, WPB Deputy Director-General for Operations, whose office was among those abolished in the latest reorganization of board, has severed all connections with WPB except to act as a dollar-a-year consultant to Chemicals Division. He left for his home in Kansas March 27.

Dr. Reid first joined the government in June, 1940, as a member of the Council of National Defense. Through the many reorganizations of the war agencies he moved up to more responsible positions. He was chief of WPB Chemicals Branch from February to November, 1942.

Critical Chemicals

National Registry of Rare Chemicals, Armour Research Foundation, 35 W. 33rd Street, Chicago, Ill., requests information concerning the following chemicals which are urgently needed by war industries:

1. Sodium tripolyphosphate
2. Sodium tetraphosphate
3. Ethylene disulfonate
4. Phenylpyruvic acid
5. p-hydroxyphenyl pyruvic acid
6. 2-nitro-4-methoxy benzaldehyde (nitro anisaldehyde)
7. o-nitrophenyl acetic acid
8. p-methoxy phenyl acetic acid
9. o-nitro-p-methoxy phenyl acetic acid
10. 2-nitro-4-methoxy toluene
11. o-nitro benzyl chloride

Alcohol from Wood

Plans for extensive experiments in the production of alcohol from products of wood hydrolysis have been completed by WPB's Office of Production Research and Development. The experiments will be carried on for about six months and are expected to provide the necessary basic engineering knowledge for the construction of a wood-sugar plant utilizing the Scholler process developed in Germany.

E. M. Shaefer, a German refugee and formerly president of the Scholler-Tornesch Company, and other refugees from Germany have been cooperating with WPB in preparing for the experiments. An appropriation of $55,000 has been set aside to finance the work.

Checking Users of CMP

Plans for checking compliance with Controlled Materials regulations are being formulated by WPB Compliance Division and, in the near future, a representative group of between 5,000 and 10,000 users of controlled materials throughout the United States will be checked by investigators for the Division.

While all CMP regulations will be covered in the survey, special emphasis will be placed on inventory controls and proper use of allotment numbers to obtain controlled materials. The survey will be extended later to cover all companies operating under CMP, including producers of both "A" and "B" products and prime and secondary consumers.

Aluminum Activities Coordinated

A combined Aluminum Committee to coordinate the activities of United States, United Kingdom and Canada in respect to that vital metal has been established with Charles E. Wilson, executive vice chairman of War Production Board, as chairman.

The body, fourth of its kind to be appointed for production and utilization of various metals, will report its findings to the WPB's Aluminum and Magnesium Division. P. W. Rolleston, Director of Material and Supply, Supply Services, British Air Commission, will prepare detailed estimates of 1943 and 1944 production and requirements of the three countries.

The first of the combined committees was appointed Dec. 15 to study the steel situation. A Committee on Copper was appointed Feb. 10 and a Committee on Rubber Feb. 16.

Beverage Spirits Out

War Production Board's alcohol and solvent section has killed any hopes distillers or others may have had that a suspension of stock piling of industrial alco-

Assume New Duties at Atlas Powder



E. W. Maynard, left, vice-president of Atlas Powder has assumed general advisory duties for all departments. M. J. Creighton, center, was appointed general manager of Industrial Chemicals Department. J. K. Weidig, right, succeeds Mr. Creighton as general manager of the Cellulose Products Department.

hol is probable. One effect of such a suspension would be to permit the production of beverage spirits by distillers.

According to WPB officials there is ample tankage available for the storage of an additional 25,000,000 gallons of industrial alcohol. There are now approximately 90,000,000 gallons of industrial alcohol in storage.

Peru to Send U. S. Rubber and Quinine

Peru is now prepared to supply the United States with quantities of rubber, quinine and other strategic materials. Under the terms of a pact signed recently with the United States, the South American country is selling its entire output of quinine, twenty-four tons yearly, to this country at cost, Dr. Cesar Gordillo, Director General Public Health, of Peru, declared recently.

Helium Process Speeded

Peter Kapitza, Soviet physicist, is reported to have invented a process for producing liquid helium at the rate of seven liters an hour, which is faster than any other known method.

He has been able to establish that at ultra low temperatures liquid helium is not viscous and that a liter of liquid helium will filter through a hole in one second whereas it would take an equal quantity of water a thousand years to penetrate the same aperture.

Sherman Heads Bureau

Dr. Henry C. Sherman, professor of chemistry in Columbia University, and internationally known for his researches in nutrition, has been appointed head of the new Bureau of Human Nutrition and Home Economics of Department of Agriculture. He will direct the work previously carried on by Bureau of Home Economics and Division of Protein and Nutrition Research of the Bureau of Agricultural Chemistry.

COMPANIES

Rubber Production Begins

Marking an important step in the relief of the rubber draught, two synthetic rubber plants being constructed by Blaw-Knox Co. for leading rubber manufacturers have gone into production.

At Institute, W. Va., the first unit of plant being built for United States Rubber Co. has been completed; when the final units begin producing, this plant will have a capacity of 90,000 tons a year. The Baton Rouge plant built for Firestone Tire and Rubber Co. has a capacity of 30,000 tons a year. These two plants are the first of a large number which will come into production this year.

Oil Company Formed

Increasing versatility of petroleum in the development of important chemicals has led to the formation of Oronite Chemical Co. as a subsidiary of Standard Oil of Cal. The new concern will produce and market a variety of industrial chemicals made from petroleum. Officials of Oronite are: R. G. Smith, president; R. G. Follis and M. L. Baker, vice presidents; B. W. Letcher, secretary; and H. C. Judd, treasurer.

Koppers Opens Boston Office

Transfer of New England District offices of Koppers Co., Tar and Chemical Division, from Providence, R. I., to Boston Consolidated Gas Building, Boston, Mass., has been completed. Tar and Chemical Division engages in the sale of roofing and road tars, wood preserving oils, waterproofing materials, bituminous paints, tar acids, light oil distillates, agricultural insecticides and other related chemical products.

Eimco Opens New Lab.

Eimco Corporation has established an additional filtration laboratory in connection with their Chicago Office, 111 West Washington St., Chicago, Ill. Its filtration engineering staff has been enlarged and Paul Richter placed in charge of filtration equipment department replacing C. J. Peterson.

Agicide Relocates

Agicide Laboratories, Inc., have announced the removal of their Milwaukee plant to 1717 Taylor Avenue, Racine, Wisconsin.

Army-Navy "E" Awards

Wannamaker Chemical Co., Inc., Orangeburg, S. C.

Hynson, Westcott & Dunning, Baltimore, Md.

Consolidated Chemical Co., Baton Rouge, La., plant.

E. I. du Pont de Nemours & Co., Alabama Ordnance Works, Sylacauga, Ala.

E. I. du Pont de Nemours & Co., Morgantown Ordnance Works, W. Va.

Hercules Powder Company, Port Ewen, N. Y., plant.

Hercules Powder Company, Hopewell, Va., plant.

National Fireworks, Inc., Elkton branch.

Merck & Co., Inc., East Falls plant at Philadelphia, Pa.

Merck & Co., Inc., Stonewall plant at Elkton, Va.

Standard Oil Development Co. and Esso Labs., Bayway, N. J.

Pittsburgh Coke & Iron Co., Neville Island plant.

Cook Paint and Varnish Co., North Kansas City, Mo.

New Boston Office for Hercules

Hercules Powder Co. has opened sales offices in Boston for its synthetic explosives, and paper makers chemical departments. Homer C. Simmons, New England manager of sales of cellulose products department will head the Boston unit.

Dow Corning Corp. Formed

Dow Chemical Co. of Midland, Mich., and Corning Glass Works of Corning, N. Y., have announced the incorporation of a new company, the Dow Corning Corporation, to be equally owned by the two parent companies.

The new company is organized for the purpose of manufacturing and selling resinous materials and is the result of a number of years of research on the part of both companies. Officials stated that the formation of the new company would greatly accelerate the development and production of these newly developed materials.

Officers are Dr. E. C. Sullivan, president; W. R. Collings, vice-president and general manager; Dr. E. C. Britton, secretary; C. D. LaFollette, treasurer.

Buys Tuckahoe Plant

O. D. Chemical Co. of N. Y., inventors of a powder deodorant, have purchased a 3-story brick plant at Tuckahoe, N. Y.

New Chemical Firm

Joseph R. Morton, president of Morton Chemical Co., has been elected president of a new organization known as Sulphonics, Inc., which is equipped to begin early production at Baltimore, Md., of chemicals for the war.

The new corporation is jointly owned by Morton Co., Standard Wholesale Phosphate and Acid Works, and Charlotte Chemical Laboratories.

George A. Whiting, president of Standard Phosphate has been elected chairman of board of new firm.

Worcester Salt Sold

Worcester Salt Co's refinery at Silver Springs, N. Y., was sold March 18 to Morton Salt Co. of Chicago. The purchase price was $2,400,000 cash. The company was established fifty years ago and has been in continuous operation since. The plant will continue operation, it is announced.

Acrylonitrile Plant Nears Completion

Construction of a second plant for manufacture of "acrylonitrile," vital organic constituent of Buna-N synthetic rubbers, was announced by Rohm & Haas Co. New $300,000 plant, which is expected to be completed early this year will bring to four the number of acrylonitrile plants

in operation in this country. To save critical materials in construction, most of the equipment in new unit is being erected out-of-doors, following principles of construction generally used in the petroleum industry.

ASSOCIATIONS

Cereal Chemists Meet

The twenty-ninth annual meeting of American Association of Cereal Chemists will be held in St. Louis, Mo., May 17 to 19. Thirty-eight papers are scheduled for the symposium which emphasizes the industrial utilization of cereals. Several of these are Bacterial Fermentation of Cereal Carbohydrates, the Distillation Industry in War and Peace. Industrial Utilization of Corn Proteins, Oil Products from Cereal Grains, and Industrial Uses of Wheat Proteins. All interested in these subjects are invited to attend the meetings.

Asphalt Group Elects

Herbert Spencer has been re-elected president of the Asphalt Institute, comprising most of the major petroleum asphalt producers of United States and Canada. J. A. Blood, Standard Oil Co. of California, was named chairman of the executive committee. Bernard E. Gray was promoted from chief engineer to the post of general manager and chief engineer.

Ethyl Vice President

John H. Schaefer has been elected a vice president of Ethyl Corp. He continues in charge of all manufacturing, traffic and manufacturing research activities.

Nobel Winner Lectures

Dr. Peter Debye, Nobel Prize winner in Physical Chemistry, spoke on "X-Ray Diagrams of Imperfect Crystals" at Cleveland A.C.S. meeting March 17. An interpretation was given in simple terms, of the effects of internal strain, misplaced atoms, and thermo-motion in a crystal on the X-Ray diagram. The guest speaker showed how the same kind of reasoning can be employed in discussing the nature of distortions other than thermal.

Dr. Debye came to this country from Germany because he was opposed to the Nazi régime. He is now professor of physical chemistry at Cornell University.

PERSONNEL

Standard Oil (N. J.) Promotes

L. F. McCollum, formerly president of Carter Oil Co., wholly owned by Standard Oil Co. of New Jersey, has been made assistant to C. H. Lieb who is in charge of all producing operations of all subsidiary organizations of the parent company. Mr. McCollum will be succeeded by Oscar C. Shorp, formerly vice-president of Carter Co.

Dr. Spencer-Strong, Pemco Research Director

Porcelain Enamel and Manufacturing Co. announces the appointment of **Dr. George H. Spencer-Strong** as director of research. Dr. Spencer-Strong succeeds **Lyman C. Athey**, who resigned recently to accept the position of vice-president of International Products Corp.

Biochemist Promoted

Dr. L. S. Palmer, professor of agricultural biochemistry at Univ. of Minnesota, has been named chief in Division of Agricultural Biochemistry by board of regents of the university.

Battelle Appoints

John Farley Foster, former research chemist for the General Electric Co., has been appointed to Battelle's division of fuels research. Dr. Foster is engaged in research on development of improved methods for manufacture of gas from coal.

Elias A. Johnson, formerly Chicago manager of National Aniline Div., Allied Chemical & Dye Corp. has been appointed vice-president of Fearn Laboratories.

Hayward Elected Regent

Ralph A. Hayward, president of Kalamazoo Vegetable Parchment Co. and a University of Michigan graduate in chemical engineering, has been elected to board of reagents of that university.

Other Personnel

John Cooley, formerly with Drier Division of Advance Solvents & Chemical Co., is now associated with the N. Y. office of Reichhold Chemicals, Inc.

Dr. Nicholas N. T. Samaras and **Dr. Ray W. Sudhoff** have been promoted to assistant directors of Central Research Department, Monsanto Chemical Co.

Dr. Joseph Mattiello has been elected a vice-president of Hilo Varnish Corp. He is past president of New York Paint and Varnish Production Club and until recently was member of Protective and Technical Coatings Industry Advisory Committee, from which he resigned because of his work as consultant on protective coatings for Office of the Quartermaster General in Washington, D. C.

Charles R. Dorsett has joined the research laboratory of Wishnick-Tumpeer as chief paint chemist. Mr. Dorsett comes to Wishnick-Tumpeer from Alkydol Laboratories, manufacturers of synthetic resins, and Glidden Co.

C. H. Lowary, manager of Knoxville, Tenn., plant of Anacin Manufacturing Co., has been elected a vice-president of the company.

Frank J. De Rewal, former research chemist for Foote Mineral Co., Pa., has been appointed to the research staff of Battelle Memorial Institute, Columbus, O., and assigned to its division of non-ferrous metallurgy.

Appointed Chief Chemist

William W. Lewers, recently with du Pont, has been made chief research chemist for Griffin Mfg. Co.

OBITUARIES

W. Ralph Gawthrop

W. Ralph Gawthrop head of patents section of ammonia department of Du Pont died at his home on Sharpley School Road, Wilmington, Del., at the age of 44.

Lt. Colonel Walter W. Plechner

War Department reported on March 17th that Lieutenant Colonel Walter William Plechner of Metuchen, N. J., was killed in action in defense of his country on March 4th, in the North African area. He is survived by his wife and 10-year-old son.

Lieutenant Colonel Plechner, then a captain of Infantry Reserve, was called on December 20, 1940 from his position as assistant director of research of Titanium Division, National Lead Co., to active duty with the staff of the 1st Infantry Division.

Garfield Powell

Dr. Garfield Powell, assistant professor of chemistry at Columbia University and an assistant to the dean of Columbia College, died April 5 of a heart attack in the university medical office. He was 49 years old and lived at Fair Lawn, N. J.

Robert Harcourt

Known internationally as a chemist of outstanding ability, Dr. Robert Harcourt, retired professor of chemistry, Ontario Agricultural College, died at his home March 19. His death brought to a close a career that had received recognition both in Canada and United States.

Andrew J. Patton

Andrew J. Patton, leader in varnish industry in New Jersey and manager of Devoe & Raynolds Co. at Newark, died March 20 at his home in Belleville, N. J., after a long illness. His age was 81.

Edward H. Warnecke

Edward H. Warnecke, retired member of Stroock & Wittenberg and associated for many years with natural resin field, died March 21 after a long illness.

FINANCIAL

Am. Cyanamid Net Down

American Cyanamid Company and Subsidiaries report for 1942 a net income after Federal and foreign income and excess profits taxes of $15,100,000 was $5,666,-901, compared with $6,347,398 after taxes of $11,457,636, in 1941. Earnings for common stock were $1.95 and $2.42 a share in the respective years. However, including equity in undistributed net income of Southern Alkali Corp. and other affiliated companies net income a common share was $2.05 in 1942 and $2.56 in 1941.

Westvaco Earns $2.49

Westvaco Chlorine Products Corporation and Subsidiaries report for fifty-two weeks ended on Jan. 2 a net profit, $1,142,582, equal to $2.49 a common share, compared with $1,296,164, or $2.92 a share, in the fifty-three weeks ended on Jan. 3, 1942. Federal income taxes last year were $668,658 and excess profits tax, after a deduction of $79,000 for the post-war refund, amounted to $711,000. In 1941, these taxes were $604,000 and $272,000, respectively.

Heyden Sales Up

Preliminary report of Heyden Chemical Corp. for year ended December 31, 1942, shows a net profit of $709,512 after charges and federal taxes, equal after preferred dividends, to $5.96 a share on the 104,983 shares of common stock.

This compares with a net profit in the preceding year of $1,003,647 or $9.04 a common share. Sales for 1942 were $11,156,718 against $9,548,606 in 1941.

Gen. Aniline Nets $3,483,466

Net income of General Aniline & Film Corp. in 1942 amounted to $3,483,466, subject to war contract renegotiations, comparing with $4,115,731 in 1941. Gross sales were $43,240,715, against $45,644,-761 for 1941, according to report on the first year's operations under United States Government supervision of the major German company taken over by Alien Property Custodian.

R. E. McConnell, chairman of the board, says that the 5.3% decline in sales came about primarily because of the substantial decline in civilian consumption of dyestuffs and photographic products, resulting from war-time restrictions and the conversion of the camera plant to the production of precision instruments.

INDUSTRIAL TRENDS

Barometers

There was another small increase in production during week of April 9th. Two of the weekly production barometers reached the highest level this year. Steel production edged higher to 99.6% of capacity from 99.5% last week, increasing tonnage output to 1,724,700 tons from 1,723,000. Electric power production declined seasonally from 3,928,170,000 kilowatt-hours to 3,889,858,000. Daily average crude oil production rose to 3,917,-700 barrels from 3,418,300, topping all records since last September.

Both general business barometers declined. Freight carloadings declined to 772,133 from 787,360. Bank clearings in 22 cities outside New York fell off to $3,507,173,000 from $3,721,489,000.

Expenditures of Governments

Expansion of government expenditures since the war has, says February number of League of Nations *Monthly Bulletin of Statistics*, been determined on the one hand by the war effort and on the other by the level of prewar government expenditure. In the United Kingdom, for instance, the total expenditure of the central government is now about five times as great as in the last prewar year. In Canada it is about six times, in Australia eight times and in the United States nearly ten times as large as in 1938/39. In Germany and Japan, where a considerable growth had taken place before 1938, there appears to have been a three-fold increase since that date. Even in neutral Sweden and Switzerland, total government expenditure is now approximately three times as great as before the war.

Prices and Cost of Living

According to March number of League of Nations *Monthly Bulletin of Statistics*, published by League of Nations Mission at Princeton, N. J., wholesale prices in the United States at the end of 1942 were 32% higher than in the first half of 1939 and cost of living 22% higher. Both had risen more than in Canada although prices in Canada started to rise immediately after the outbreak of war while in the United States wholesale prices did not begin to rise till the latter part of 1940 and the cost of living till the second quarter of 1941. Wholesale prices in the Argentine, Peru and Chile rose during the period covered to much the same extent (80% to 90%), but the cost of living rose 80% in Chile, rather less than 40% in Peru and as little as 13% in the Argentine.

In the United Kingdom wholesale prices were practically unaltered during the last nine months of 1942 at a level some 65% above the January-June 1939 average, and the cost of living showed little change since the beginning of 1941 at a level about 30% above that average. By far the greatest rise has been in China where both series by the end of the third quarter of 1941 were 500% above the prewar average.

In Germany wholesale prices and cost of living have been firmly held down to about the same level, each showing at the end of 1942 an increase of less than 10% over the prewar level. Elsewhere in Continental Europe, wholesale prices have risen considerably; up to the closing months of 1942, by 90-100% in Switzerland, Denmark and Portugal, by about 80% in Norway and Sweden and by over 70% in Spain; up to July 1942, by nearly 115% in Finland; up to April 1942, by nearly 140% in Turkey. Corresponding increases in the cost of living were: nearly 100% in Turkey, 80% in Finland, almost 70% in Spain, about 55% in Denmark and Portugal and almost 50% in Norway and Sweden. In Yugoslavia, the cost of living in July 1942 was 230% over the prewar level.

CHEMICAL SPECIALTY COMPANY NEWS

Self-Polishing Floor Wax

Self-polishing type of floor wax both slip-retardant and water-resistant is being introduced by finishes division of du Pont.

Designed as a durable, protective glossy coating for linoleum, asphalt tile, rubber, finished and unfinished wooden floors in homes, offices and institutions, du Pont Self-Polishing Wax has been extensively tested.

A high percentage of natural Carnauba wax combined with a special emulsifying agent is said to contribute qualities of unusual wearing ability and resistance to water. The new product is easily spread with applicator, mop or cloth. No rubbing is required and the laboratory-balanced film dries in twenty minutes.

The slip-retardant feature is valued as a safety measure. High degree of resistance to water reduces the frequency of re-waxing.

Studies Glycerin Substitutes

Substitutes for glycerine in specific products have been studied by the scientific advisory committee of the Toilet Goods Association, but due to wide differences in formulation the committee is not prepared to make specific recommendations, it was announced yesterday. Recommending that all substitutes be thoroughly investigated, the committee listed twelve items, which with one exception are generally available.

Synthetic Wax for Inks

Carbon paper inks may be improved by replacing beeswax and ceresine by new synthetic wax, B. Z. Wax A light introduced by Glyco Products Co. This synthetic wax, it is claimed, promotes retention of oils in the wax mixture, will not bloom and helps prevent bloom in other materials. It causes the ink to age much less and stops aging after three days. Being a little softer than the usual waxes, less is required to accomplish its purpose. B. Z. Wax A light, it is said, does not increase surface stickiness and because of its aid in the dispersion of the pigments, a better finish is obtained.

Warwick Produces Synthetic Waxes

Warwick Chemical Co. of West Warwick, R. I., and Rock Hill, S. C., announces a program for the manufacture of synthetic waxes. Dr. Ernest Stossel, who has conducted research work and developed production methods for these products, will direct the program.

Now under construction, a new unit for manufacture of its synthetic waxes is expected to be in production the latter part of April. Other products to be manufactured in new unit will be oxidation products of hydrocarbons made according to novel processes invented by Dr. Stossel.

New Spray Fungicide

Fermate, ferric dimethyl dithiocarbamate, a new fungicide, promises to be a satisfactory substitute for the cuprous (copper) oxide and cottonseed oil, which have been used for several years for controlling downy mildew (*Peronospora tabacina* Adam) of tobacco, and which may become scarce due to war demands.

Fermate gave excellent results at Quincy, Florida, during the 1942 plant bed season. The new material has also been tested at the Connecticut and Pennsylvania Agricultural Experiment Stations and reported as giving excellent control

of the disease. Control obtained with fermate was somewhat better than with the cuprous oxide-cottonseed oil spray.

Because of its effectiveness, combined with its low cost and convenience in mixing, fermate is recommended as a substitute for the cuprous oxide-cottonseed oil spray.

Varnish Stripper

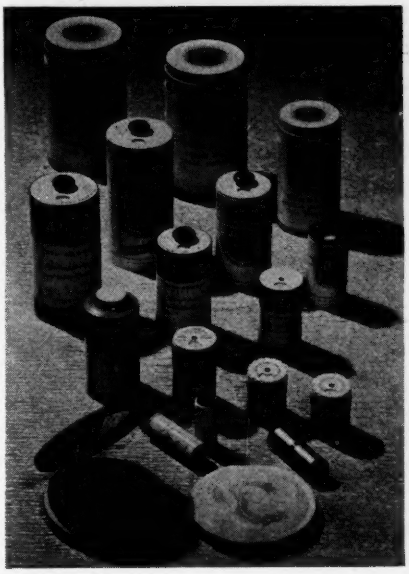
Stripping medium which, it is claimed, provides easy removal of insulating varnish from portions of the electrical equipment where varnish is not desired, has been developed by Sterling Varnish Co., Haysville, Pa.

When complete varnish treatments are finished, any varnish which has adhered to portions previously treated with the stripping medium and which should be varnish free can be removed with a wood or bakelite knife without marring or disturbing close tolerances.

Wood Treatment

Newly developed improvements in the chemical treatment of wood to make it fire, decay and termite resistant and still paintable have helped to make forest products a major heavy construction material over the past year, according to W. F. Munnikhuysen, head of Wood Preserving Div. of Koppers Co. Such timbers were becoming more common in large buildings before the war, and because of shortages of other permanent construction materials their use was greatly accelerated in 1942.

Prize Packages



A special award by the judges in the All-America Package Competition was given this year to the F. N. Burt Company, of Buffalo, New York, for outstanding, meritorious, creative developments of paper substitute packages to help keep a variety of products flowing to the consumer. Some of the packages such as compacts, lipsticks, powder cans and jar tops are shown.

Lack Grease for Cutting Oils

Need for increasing nation's production of grease and lard oils to meet wartime demands was discussed at recent meeting of Grease Oil Producers Industry Advisory Committee of Food Distribution Administration. The committee recommended that in view of the importance of these oils to machining operations in war industries, the raw materials for their production should be channeled to grease and lard oil producers in sufficient volume to permit plant operations at full capacity.

Worm Parasite Control

Two labor-saving methods of using phenothiazine to control injurious worm parasites of sheep are described in instructons just issued by the U. S. Department of Agriculture. The use of this chemical for protecting health of sheep, important now because of war needs for meat, wool, shearling pelts, and surgical sutures, is a recent development in veterinary science, but the work involved in dosing large flocks has presented a difficult problem, especially when sheep are on large pastures or ranges.

Investigations by Government parasitologists have shown the practicability of mixing 1 part of the chemical with 9 parts of salt and placing the mixture in open containers sheltered from the weather.

Summary of War Regulations

Ammonium Sulfate

Mar. 20, 1943. An amendment to M.P.R. 205 relieves consumers of ammonium sulfate from paying transportation charges from the point of production to the point of warehousing and requires payment of charges only from the nearest inland oven to the point of ultimate destination.

Arsenical Insecticides

Apr. 6, 1943. Revised M.P.R. 315 establishes maximum prices for two of the common arsenical insecticides.

Calcium Metal

Mar. 31, 1943. Direct allocation control over calcium metal is established by Order M-303.

Casein

Apr. 8, 1943. Amendment 8 to M.P.R. 289 establishes specific ceilings for industrial casein at all levels f.o.b. shipping point at prices 5 to 10% higher than the previous ceilings based on September 28–October 2, 1942, levels.

Caustic Soda

Mar. 18, 1943. Control of shipments of caustic soda by tank car and tank truck under General Transportation Order T-1 are extended by amendment from April 1 to May 1.

Coal-Tar Acids

Mar. 30, 1943. Specific authorization by WPB for delivery or use of coal tar for purposes other than distillation when such tar contains over ½ per cent of low boiling tar acids is required by WPB Conservation Order M-97 effective May 1, 1943. The order applies only to coal tar oil containing less than 5% of total tar acids. If the oil contains more than 5% of tar acids, General Preference Order M-27 applies.

Copper Sulfate

Mar. 29, 1943. Ceiling prices for copper sulfate calculated on a base price of $5.00 per cwt. for 99% crystals are established by M.P.R. 354.

Cresylic Acid

Mar. 24, 1943. Amendment 3 to M.P.R. 192 establishes a maximum producers' price of 72.8 cents per gallon for imported grade "A" cresylic acid.

Ethyl Alcohol

Apr. 1, 1943. Amendment 1 to M.P.R. 28, effective as of February 27, permits converted beverage distilleries producing industrial alcohol for the government, and converted distilleries selling high wines, to adjust ceilings to reflect increased prices for corn and other grains.

Fats and Oils

Mar. 20, 1943. Amendment 25 to Revised Price Schedule 53 sets dollars and cents prices for West Coast and also increases nation wide price ceilings on certain fats and oils.

Mar. 24, 1943. Specific authorization by the Director of Food Distribution is required under Food Distribution Order 32 in order to accept delivery or to use castor oil. Exemption is made for amounts of not more than 40 pounds a month. This new order replaces WPB Order M-235.

Mar. 24, 1943. Food Distribution Order 39, replacing WPB Order M-57, requires specific authorization by the Director of Food Distribution to make or accept deliveries of tung oil.

Mar. 28, 1943. Ration certificates are required for industrial consumers of rationed fats and oils who intend using these materials for edible, experimental or internal medicinal purposes.

Apr. 1, 1943. WPB Order M-60-a changed to Food Distribution Order 46. Provisions remain the same.

Fine Chemicals

Apr. 3, 1943. Saccharine, caffein, anhydrous caffein, citrated caffein, theobromine, vanillin, ethyl vanillin, coumarin, salicylic and acetlysalicylic acids, ascorbic acid and citric acid were placed under specific dollars and ceilings by M.P.R. 353.

Glycerine

Mar. 24, 1943. Authorization must be obtained from the Director of Food Distribution to use more than 50 pounds of glycerine in any month, according to Food Distribution Order No. 34 which replaces WPB Order M-58.

Hydrocarbons

Apr. 5, 1943. Amendment 86 to Revised Price Schedule 88—Petroleum and Petroleum Products exempts certain products from its provisions.

Laboratory Equipment

Mar. 1943. Deliveries of laboratory equipment for college military training programs is further curtailed by amended Order L-144.

Mineral Oil Polymers

Mar. 27, 1943. Administration of Order M-258 is transferred to the Office of the Petroleum Administrator by amendment.

Osmium

Mar. 16, 1943. Use of Osmium for all purposes except manufacture of electrical contacts is prohibited by WPB Conservation Order M-302.

Petroleum Sulfonates

Mar. 27, 1943. Administration of Order M-188 is transferred to the Office of the Petroleum Administrator by amendment.

Quinacrine

Apr. 1, 1943. Quinacrine, also known as atabrine, is placed under allocation by Order M-306.

Riboflavin

Mar. 31, 1943. Direct allocation control of riboflavin, also known as vitamin B_2 or G, is established by Order M-299.

Sulfuric Acid

Mar. 30, 1943. All sales to government ordnance plants of 40% oleum, otherwise known as 109% sulfuric acid, are excluded from price control under G.M.P.R. until July 3, 1943, or until another regulation covering this commodity can be established.

Apr. 3, 1943. Amendment 143 to Supplement Regulation 14 of G.M.P.R. permits buyers and sellers of sulfuric acid to adjust prices on any deliveries contracted prior to March, 1942, and completed after April 2, 1943 to levels not higher than those established in forthcoming price regulations.

Superphosphates

Mar. 30, 1943. Specific dollars and cents maximum prices, uniform to all sellers at each producing point in the United States, are established for all grades of superphosphate by amendment to Regulation 14 of G.M.P.R.

Synthetic Rubber Raw Materials

Apr. 5, 1943. Amendment 57 to Supplementary Regulation 1 exempts certain products from its price control provisions when sold for use in the manufacture of synthetic rubber.

Thermoplastics

Mar. 26, 1943. The list of civilian products for which thermoplastics may no longer be used is increased by amendment to General Preference Order M-154.

Thermoplastic Scrap

Mar. 22, 1943. Ceilings for the 8 major types of thermoplastic scrap, also pricing formulas for sales of other types at levels about 25% below March, 1942, are established by M.P.R.. 345.

Zinc Dust

Mar. 23, 1943. Order M-11-1, placing zinc under allocation extended until revoked.

Zinc Oxide

Mar. 1943. The clause requiring certification by users to suppliers is eliminated from Order M-11-a.

Prepared Monthly by U. S. Industrial Chemicals, Inc.

U.S.I. CHEMICAL NEWS

April ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1943

Curbay B-G Helps Meet Egg and Meat War Effort Quotas

U.S.I.'s B-Complex Supplement Useful in Chick and Hog Feeds

55,000,000,000 eggs, 4,000,000,000 pounds of chicken meat and over 60,000,000 swine fed to 235 pound weight have been set by the Department of Agriculture as the 1943 quotas needed for support of the war effort. With these increased quotas set, Curbay B-G, U.S.I.'s riboflavin feed supplement, is taking on new importance as an aid in supplying the required units of the B-G complex essential in adequate poultry and hog rations.

Curbay B-G has, through the past years, demonstrated its effectiveness in replacing more expensive Vitamin B-Complex supplements — such as dried skim milk powder. The use of U.S.I.'s product has been responsible for releasing millions of pounds of dried skim milk powder for shipment to the United Nations for human food. Thus Curbay B-G represents a double contribution toward meeting increased food requirements.

Improved Moisture-Proofing Coating Composition Patented

WILMINGTON, Del. — A patent for making a moisture-proof coating composition said to have improved heat-sealing properties and anchorage was assigned recently to a company here.

Plasticizers of the ester type are condensed with resins, either natural, modified or synthetic. Dibutyl phthalate is said to be particularly advantageous as the plasticizer component. Mixing the condensation product with paraffin wax or nitrocellulose, suitable coating compositions are said to be obtained for moisture-proofing regenerated cellulose sheets and films.

The formula for a typical coating of this type is as follows:

	Parts
Nitrocellulose	40
Paraffin wax	2
Ethyl acetate	400
Toluene	160
Alkyd resin	10
Dibutyl phthalate	30

Color-Dispersing Process Prevents Haze in Films

ROCHESTER, N. Y. — A method for dispersing a coloring material in a water-swellable photographic colloid (such as gelatin) and maintaining the particle size small enough to prevent haze in the resulting film has been developed by two inventors here.

The coloring material is mixed with a water-insoluble material, such as collodion, in a common solvent, such as butyl acetate. This solution is then added to an aqueous one containing a dispersing agent. The mixture may next be passed through a small homogenizer and the suspension thus formed heated, preferably under vacuum, to remove the butyl acetate. Finally, the suspension of fine particles in the aqueous solution is added to a gelatin emulsion and, after mixing with it, the resulting emulsion is coated.

Acetoacetarylides Developed By U.S.I. for Research Study

Aid to Manufacturers in Meeting Post-War Needs Seen in Many New Dye Intermediates Produced on Laboratory Scale

Recognizing the growing importance of yellow pigments and dyestuffs, U.S.I. has developed a number of new acetoacetarylides on a laboratory scale in addition to the five now being produced commercially. Acetoacetarylides have proven particularly valuable in the production of the Hansa and newer yellows where an acetoacetarylide is coupled with a diazotized amino compound, preferably containing nitro groups which help to retain the insolubility in oil and thus prevent bleeding.

New impetus to acetoacetarylides as pigment dye intermediates has been brought about by the expanded utility of yellow pigment dyestuffs due to the absorption of chrome yellow production for olive drab pigments. In addition to the Hansa Yellows, toluidine and benzidine yellows have come into favor recently where color tone, brilliance and durability are desired.

New Acetoacetarylides

The heightened interest in acetoacetarylides has both brought about a greater demand for those compounds now commercially available and increased the desire to study new ones with a view to post-war applications. Among the newer acetoacetarylides developed by U.S.I. are the following:

- Acetoacet-para-phenetidide
- Benzoylacetanilide
- Diacetoacetyl-meta-toluylenediamine
- Diacetoacetyl-para-phenylenediamine
- Acetoacet-para-nitroanilide
- Acetoacet-2, 5-dichloroanilide
- Acetoacetyl-alpha-naphthylamine
- Acetocetcumidide (pseudo)
- N,N'-Diacetoacetbenzidide
- Ortho-phenylacetoacetanilide

Sample quantities of these new compounds will be gladly sent upon request to manufacturers for laboratory experimentation.

(Continued on next page)

Thymolphthalein as Indicator In Red, Brown Titrations

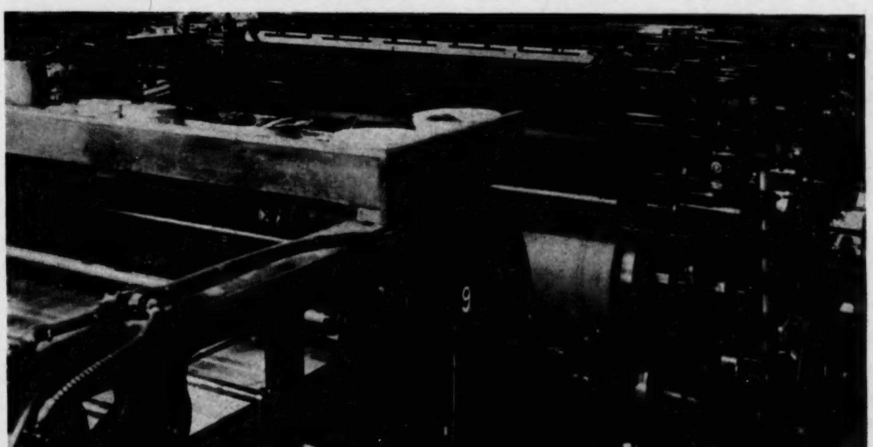
PROVIDENCE, R. I. — Thymolphthalein is a satisfactory indicator to use in titrating reddish or brownish solutions, where phenolphthalein and methyl orange are not satisfactory, according to findings reported recently in "The Chemist Analyst."

Thymolphthalein is said to change from colorless at pH of 9.3 to blue at 10.5. A convenient solution is described as containing 0.1% of the indicator in an 80% aqueous solution of ethanol.

Butanol Claimed to Stabilize Ethanol, Hydrocarbon Mixture

Butanol is a practical stabilizer for the preparation of a fuel mixture of hydrocarbons and ethanol of more than 188 proof, according to a recent report.

The addition of 5% butanol to ethanol of 192 proof, for example, is said to give mixtures stable at —15°. It is noted that the water-absorbing power increases with butanol at a greater rate than with ethanol. Practically, the sensitiveness is claimed to correspond to 19.4° per cc. of water added to 100 volumes of mixture.



The exacting requirements of modern printing provide one of the outstanding reasons for the use of the Hansa Yellows.

April ★ **U.S.I. CHEMICAL NEWS** ★ 1943

New Reagent for Sodium Calls for Use of Ethanol

PRINCETON, N. J.—Systematic experiments have shown that a reagent for the determination of sodium can be produced through the use of ethanol. It is at the same time more insensitive toward lithium and more sensitive toward sodium than aqueous reagents now in common use, according to a chemist here.

The composition of this alcoholic reagent is as follows:

Uranyl acetate dihydrate	40 grams
Cupric acetate monohydrate	25 grams
Glacial acetic acid	100 ml.
Ethanol, 95%	500 ml.
Water	450 ml.

The salts are dissolved in the water and acetic acid at a temperature of 50° to 60° C. and, after cooling down to room temperature, the ethanol added with constant stirring. After standing at least one day, preferably two or three, the mixture is stirred and filtered in the same way as in the preparation of regular aqueous reagents.

Non-Leafing Aluminum Paste Does Not Require Grinding

LOUISVILLE, Ky. — A new non-leafing aluminum paste has been developed by an inventor here in which the deleafing action is brought about chemically without the need for grinding.

The preferred method of making this paste consists of adding to a regular, full leafing aluminum powder a suitable thinner or carrier in which has been incorporated a deleafing agent consisting of the highly polar active alcohols, esters, ketones, and aldehydes.

A typical formula calls for 60 pounds of aluminum powder (fully polished and leafing), 20 pounds of ethyl acetate and 20 pounds of toluol.

Ethyl Acetoacetate Used To Extract Lignin From Wood

Ethyl acetoacetate may be used as a solvent in the presence of hydrochloric acid to isolate lignin from white quebracho wood, according to a recent discovery.

Extension of lignin by this solvent is not quantitative, as determined by the König method, but the greater portion is isolated from the other components. A high hydrochloric acid concentration, 10% of the ethyl acetoacetate, and a temperature of 40° for 24 hours are said to give the best extraction.

New Acetoacetarylides

(Continued from previous page)

One of the most widely known of the acetoacetarylides now produced commercially by U.S.I. is acetoacetanilide. This compound is prepared by reacting ethyl acetoacetate, an important intermediate in dyestuffs and pharmaceuticals itself, with aniline thereby eliminating ethanol. Hansa Yellow G is formed when acetoacetanilide is coupled with diazotized meta-nitro-para-toluidine. The use of other diazotized amino compounds produces slightly different shades.

Other Compounds

Four other acetoacetarylides which may be used in the same general way to produce the desired shades of yellow are also commercially available from U.S.I. They are acetoacet-ortho-chloroanilide, acetoacet-para-chloroanilide, acetoacet-ortho-toluidide, and acetoacet-ortho-anisidide.

Dyestuff manufacturers are aided in obtaining the desired shade and clarity by the exacting production methods developed by U.S.I. which reduce impurities to extremely small limits. For although such factors as temperature, agitation, and drying time all play important roles in the ultimate clarity of yellow pigments, manufacturers have found through experience that the purity of the intermediates is of utmost importance.

Ethanol Aids Dispersement Of Vitamin Compositions

NEWARK, N. J.—By the use of ethanol as a solvent, an inventor here claims that fat-soluble vitamin compositions may be easily dispersed in aqueous media.

To produce this water-dispersible composition, the vitamin concentrate is mixed with a solution of ethanol and a substance selected from the group consisting of the alcohol-soluble portions of edible gums.

Starch Fractionated With Butanol, Isoamyl Alcohols

Butanol and isoamyl alcohols can be used to fractionate starch without retrogradation or hydrolytic degradation, it was reported recently. The precipitated fraction, which has a higher alkali number than the non-precipitated fraction, separates in the form of an addition compound with the butanol. The lower alcohols were ineffective, it is stated, while octyl alcohol and cyclohexanol precipitated all of the starch indiscriminately.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A slime-preventing chemical is offered in powdered form for addition to wood pulp in a beater. Five ounces of the chemical to one ton of pulp is said to be adequate. **(No. 680)**

U S I

A thermoplastic corrosion-proofing material has been developed as a substitute for rubber for lining tanks, pipes and pipe fittings. Black in color, it is applied in a similar manner to rubber. This product is claimed to resist attack by non-fuming nitric acid, chromic acid, alcohol, petroleum, gasoline, linseed oil, vegetable oil and soaps. **(No. 681)**

U S I

A cellulose paper-base medium is offered which, it is said, can be impregnated with glue and protein materials, rubber, rubber substitutes, and both natural and synthetic resins either with or without lamination. **(No. 682)**

U S I

An emulsifier has been put on the market which is described as a high dispersion product of oil in water and water in oil that is especially useful in the manufacture of paint products. **(No. 683)**

U S I

Skin protectors which the maker claims can be used on the face as well as the hands and arms have been developed to meet a wide variety of conditions. Among the irritants they are said to counter are cutting and lubricating oils, kerosene, petroleum, solvents, thinners, lacquer, paint, ink, water, fumes, ammonium nitrate, chlorine, acids, and alkalies. **(No. 684)**

U S I

A toxic preservative for cotton rope has been put on the market which is claimed to toughen and stiffen rope, give it wear-resistance and firmness, reduce unwinding of the strands, and generally increase its efficiency. **(No. 685)**

U S I

A new method of gas analysis has been developed in which catalysis is described as superseding slow combustion in standard gas analysis apparatus, thus providing a safer and more accurate method for determination of combustible components. **(No. 686)**

U S I

An adjustable automatic pipette is offered which is said to be equally adaptable to analytical procedures and to operations requiring rapid, accurate measurement of liquids. By a simple adjustment, it is claimed that any desired volume can be delivered within 0.1 ml. **(No. 687)**

U S I

An odor neutralizer for fly spray and disinfectant formulas is being produced which the maker says is an efficacious specific for Lethane 384, Lethane 384 Special, Thanite, Velsicol and Deodorant L-37 MM&R. **(No. 688)**

U S I

A viscometer is announced for testing polymer solutions and other heavy-bodied liquids. Viscosity is determined by inverting glass tubes and comparing the rise of an air bubble in the sample with the rise of a bubble in a tube containing a known standard. **(No. 689)**

MARKETS IN REVIEW

PRICE and supply regulations appear to be affecting chemicals more profoundly as the nation finds itself deeper in a war economy, attended by further diminishing of civilian outputs. National production, in terms of the seasonally adjusted index of the Federal Reserve, vaulted the 200 mark to 201 in February. The expansion was concentrated almost entirely in the durable goods manufacturing industries, while non-durable goods outputs declined.

March and April witnessed increased rationing programs, with the certainty that more will follow in the months to come, also a widening of price and supply regulations. With chemical production fully geared to constantly accelerating war machine, there is a tendency to discount the effects of curtailed civilian activities in this industry. However, a large percentage of chemical production enters products essential to the nation's health, transportation and daily living, and these civilian outlets could not be curtailed without finding reflection in chemical output.

The Government can be expected to direct its efforts toward a reduction in so-called consumer purchases. Such purchases totaled 81½ billion dollars in 1942, and some economists believe they could be cut to 56 billions (of 1941 dollars) before reaching "bedrock levels" considered indispensable to maintenance of effective military production.

Meanwhile, the manpower problem has become a matter for deep concern at chemical manufacturing plants. It explains, along with some other factors, severe shortages at this writing in the alkalies, alcohol, glycerine, benzol, nitrogenous and other fertilizer base materials: carbide and oxygen. The filing of Manning Tables as requested by the vigilant WPB Chemicals Division is a corrective against the depletion of essential working forces by the Selective Service, but probably not a full solution.

Production of many vital chemicals is at the highest peak ever attained by any nation, yet the height of munitions production will not be reached for two or three months. Indications are that shortages will continue and that war demands at home and for Lend-Lease will remain in heavy volume. Numerous regulatory orders issued over the past month were accompanied by sweeping price action on a long list of chemicals by OPA. This determined thrust by the Government against "inflation" appears to be creating some hardship when ceilings are established without regard for rising production costs, and the chemical trade has joined many other lines of business in a general demand for relief.

Heavy Chemicals: Rising production of synthetic rubber is reaching levels that call for heavier shipments of raw materials to that great new industry. In addition to alcohol, petroleum fractions, styrene, and soap for polymerization and emulsification, it is understood that large quantities of bicarbonate of soda are specified for some operations. The first unit of the United States Rubber Company's 90,000-ton polymer plant at Institute W. Va., began operations, using butadiene processed from alcohol in ethylene operations at the adjacent plant of Carbide & Carbon Chemicals Corp. Also scheduled to start was the Copolymer Corp. plant at Baton Rouge, processing butadiene supplied by Standard Oil of Louisiana at that point.

Troublesome shortages in alkalies developed at Southern ports and immediate deliveries of caustic and bicarbonate of soda were hard to arrange. Requirements of aluminum plants meanwhile have cut deeper into producers' reserves of soda ash. Substantial shipments of caustic soda to Mexico and South American countries were followed by advances in export prices for this alkali amounting to 5% in the South and 2½% at New York. The zoning ordinance for caustic drawn in the interests of conserving transportation equipment has been delayed until May 1 although the industry had asked for postponement until June 1.

Consumers of carbide, acetylene and oxygen were requested by the WPB Chemicals Division to effect all conservation possible in these chemicals. A meeting of the Oxygen and Acetylene Industry Advisory Committee brought out the statement that the calcium carbide shortage will continue for several months owing to delays in the operation of new facilities. A "serious" shortage was forseen in oxygen over the remainder of 1943 for the same reason.

An interesting note on the carbide situation is the following statement from the *Financial Post* about production in Canada: "According to James Wilson, president of Shawinigan Water and Power Company of which Shawinigan Chemicals, Ltd., is a wholly-owned subsidiary, volume production of Shawinigan calcium carbide has increased threefold over that of 1939, with additional quantities to be made available in 1943."

OPA lowered, through a maximum price order, copper sulfate to a nationwide basis of $5 per 100 lbs., contending that it would thereby save consumers $25,000 annually in this chemical which is heavily consumed in agricultural sections as an insecticide and fungicide. While striving to please farm interests, OPA at the same time created a difficult situation for sulfate producers dependent on scrap metal in processing. Heavy consumption of white arsenic during the summer months was forecast as upturns in cotton prices have placed growers in a position to cover requirements fully in calcium arsenate. White arsenic is also a base for certain important war gases and its civilian use may be restricted by amount needed for war purposes.

The movement of fertilizers expanded as a seasonal circumstance, stimulated to very large proportions by the war crop program. Sulfate of ammonia and nitrate of soda had been sold ahead heavily under nitrogen supply regulations. Domestic potash producers awaited allocation arrangements imposed in Order M-291, scheduled to become effective for three periods beginning April 1. Small additional tonnages from Russia continue to reach here, but the great bulk of our potash needs are now supplied without dependence upon foreign production as in times past. Three producers in the Carlsbad, New Mexico, field have enlarged mining and refining operations and sizable tonnages are being supplied by companies in California and western Utah. Potash prices have been stable since 1937, probably will remain so. Substantial freight increases and a new tax on transportation have been absorbed by sellers on products sold ex-vessel or port basis.

The movement of phosphate rock out of Florida and Tennessee to superphosphate manufacturers has been quite heavy. Some puzzling cross-trends have developed in phosphate recently in that French North Africa and Russia are sending supplies here, while we are allocating the major part of concentrated phosphate fertilizers to the United Kingdom. Meanwhile, an OPA ceiling action on superphosphate came after the season's requirements had been shipped out.

Fine Chemicals: This branch of the industry experienced growing supply shortages and price ceilings on many of its major products. Price maximums based on levels as of October, 1941, were imposed on such war and civilian necessities as saccharin, caffeine, anhydrous caffein, citrated caffeine, theobromine, vanillin, ethyl vanillin, coumarin, ascorbic acid, citric acid, salicylic and acetylsalicylic acids. The OPA charged that jobbers' prices in these items were excessive; dealers contended that the new maximums left no margins to work on.

The alcohol outlook was not helped by the price row between the OPA, the farm bloc and hog raisers over farm parities for corn. Commodity Credits Corp. meanwhile was not able to sell corn from its small actual holdings, and some 100 distilleries faced a shutdown for want of raw materials. The corn supply is estimated at 2,400,000,000 bu. but of this 2,277,000,000 bu. is held on farms, mostly against Federal loans. It is planned to use 200,000,000 gallons of alcohol for conversion to butadiene for rubber in 1943, and 260,000,000 to 300,000,000 gallons for this purpose in 1944. For antifreeze, some 24,000,000 gallons have been allocated this year and including direct war needs such as smokeless powder, alcohol requirements for 1943 will run to 510,000,000 gallons. While the corn price wrangle is being straightened out distillers must lean heavily on ethylene, molasses and wheat to meet these enormous alcohol needs. High-priced raw materials for alcohol-butadiene may be ruled out in the future in view of fixed ceilings for rubber products.

Drug, pharmaceutical and toilet goods makers appear to face growing difficulties in obtaining sufficient glycerin as munitions needs here and Lend-Lease requirements are certain to expand over the next few months. Many are said to have substituted propylene glycol, but the replacement material itself is tightening up. Glucose is also being used as a replacement in some former glycerin-consuming lines. Four additional consuming groups were denied glycerin allocations entirely for April. These are dentifrices, lotions, shaving creams (which formerly were granted 25% of their base period needs), and tobacco (formerly allocated 50%).

Lower costs and competition explained two successive reductions which brought atropine sulfate down to $8.25 per ounce. West Coast production of quicksilver has improved, but the trading market is bare of supplies. Any surpluses in this material would be absorbed by the Metals Reserve Co. The March ceilings on menthol crystals are said to have discouraged its repacking in bottles for the wholesale drug trade.

Coal Tar Products: An intermediate which found itself in a strategic and somewhat insufficient supply position at the start of the war, phthalic anhydride, is now reported to be accumulating. One explanation for its better supply is the inability of glycerin production to keep pace in the manufacture of alkyd synthetic resins for coatings. Large amounts of crude naphthalene have been moving to phthalic processers, and there is reason to believe that stocks of the crude material are also increasing. At current prices, some coal tar suppliers say they would like to be relieved of the necessity of supplying naphthalene for this purpose.

The prolonged controversy over prices for imported cresylic acid reached a new phase with the issuance of higher ceilings for the British "A" grade. The price arrived at was 72.8c per gallon. The "B" cresylic was not affected. That section of the coal trade which imports cresylic doubted that the new ceiling would expand importations materially.

The Government continues to take considerable quantities of benzol for its stockpile to feed styrene production for Buna S through the ethyl benzene conversion method. Styrene is being obtained through dehydrogenation of ethyl benzene. Benzol needs for aviation gasoline remain considerable. New uses connected with the war are reported taking greater amounts of xylol. This tightens an already stringent supply situation in xylol, which only the addition of new steel-making facilities can relieve.

LEGAL ADVENTURES OF A CHEMIST

No technical or business man ever tries to be his own shoemaker or his own plumber, and it is more dangerous to be his own lawyer, but there are some everyday legal rules relating to the manufacture and buying and selling of chemicals that everyone engaged in these pursuits should know. These rules can be explained in plain English without resorting to the jargon of the law.

This series of "Legal Adventures" will bring to Chemical Industries *readers each month several episodes from the experience of Chemist Smith, a mythical chemist-manager of a typical small chemical company. Each will illustrate a common point of law likely to be encountered in chemical industry and will be based on an actual decision of an American Court.*—The Editors.

1. Case of the Factory Fire

"YOU'RE sure you can deliver this sulfate according to contract?" Chemist Smith queried, wondering about wartime shortages and that sort of thing.

"Absolutely," the salesman assured him. "Our plant's running full time, and we keep right up with our orders."

"Good enough," Smith agreed.

The seller did not deliver, however, as his plant burned a few days later, and Smith demanded performance of the contract.

"I'm not bound to deliver when the plant that I was depending on to fill your order has been wiped out of existence," the seller retorted.

"You took the risk of that when you signed the contract, and you've no more right to cancel our contract than I'd have if our plant had burned or been blown up by a Nazi spy," Smith retorted. The United States Supreme Court ruled in his favor, and there are Illinois, New York and Vermont rulings to the same effect.

Of course, if the contract of sales had contained a stipulation that the seller would have been relieved from liability under these circumstances, Chemist Smith could not have demanded performance of the contract, nor could his company have collected damages for the failure to deliver.

2. Case of the Verbal Order

CHEMIST SMITH had given a verbal order for "dry ice," exceeding the limit fixed by the familiar statute of frauds, and the sale was, consequently, not binding on either party.

Then Smith accepted part of the ice (which made the sale binding), and refused to accept or pay for the balance.

"You accepted part of the order," the jobber pointed out.

"I did in ignorance of the fact that the oral sale was not binding on me," Smith protested.

"Here's where ignorance is a bad drawback, but no excuse," the jobber averred, and the Massachusetts Supreme Court ruled in his favor.

"Where a man performs a duty, even if an unenforceable one, such as paying a barred debt, or accepting something which he had bought under an oral contract, the mistake affords no reason for excusing him," said the Court.

3. Case of the Disputed Shipment

THE SALESMAN had done his work well, and left Chemist Smith's office with a $10,000 order for assorted supplies in his pocket, and after not too many delays caused by priorities and what not, the order duly arrived at the freight yard; but on inspection Smith found that some of the order was good, some bad, and the rest indifferent—whereupon he refused to accept the supplies ordered "or any part thereof."

"We admit that some of the stuff was not up to par, but you can't cancel the whole contract. You're bound to accept the part that's all right and pay for it," the wholesaler contended.

"No—the tail goes with the hide. All or none," Smith declared. The law on this point is in his favor, and the rule is that on an entire contract of sale the buyer may, within a reasonable time after learning the facts, reject the entire shipment, if part of it does not comply with the terms of the sale.

A leading case laying down this rule is Fogg vs. Rodgers, a decision of the Kentucky Courts reported in 24 S.W. 248, and there are Minnesota, Nebraska, New York and Pennsylvania cases to the same effect.

Recent Bureau of Mines Reports

Rare Alkalis—Lithium. Lists estimated quantities of lithium, spodumene, cesium, and rubidium found in New England States and used in alloying and welding metals. Information Circular 7232. Bureau of Mines.

Tungsten Concentrates produced by a relatively small mill from complex hubnerite ores using gravity-concentration, flotation, and magnetic-separation. By C. M. Dice. Information Circular 7230. Bureau of Mines.

Oil Shale Mining. These domestic shale reserves can be used as source of gasoline and other petroleum products. Proposed methods and estimated costs are reported by E. D. Gardner and C. N. Bell in Information Circular 7218. Bureau of Mines.

Size of Mineral Particles. Prepared especially for persons with little experience, the bulletin contains simple methods for determining particle size. Covers units and properties of size, application of sizing, the methods, and interpretation of results. References attached. Information Circular 7224 by John Dasher. Bureau of Mines.

"Marketing Kyanite and Allied Minerals," by N. C. Jensen details information on the occurrence, properties, qualities, uses, sources of supply, markets, and prices of kyanite, andalusite, sillimanite, dumortierite, mullite, topaz, and pinite. Also list of potential buyers and bibliography of refractory materials. Information Circular 7234. Bureau of Mines.

"Wetting Agents in Reducing Dust Produced by Wet Drilling in Basalt," by J. A. Johnson. Use of wetting agents to reduce interfacial tension in order to permit wetting of dust particles to keep dust concentration within desired limits. R. I. 3678. Bureau of Mines.

"Inflammability of trichloroethylene-oxygen-nitrogen mixtures," by G. W. Jones and G. S. Scott. Trichloroethylene, usually considered non-inflammable, recently has been proposed for use in anaesthesia on assumption that it does not produce inflammable mixtures with oxygen and nitrous oxide. Tests show that, although it does not produce inflammable mixtures with air, it does when air is enriched with oxygen and in the presence of pure oxygen has rather wide limits of inflammability. R. I. 3666. Bureau of Mines.

PROFESSIONAL DIRECTORY

Heavy Chemicals, Coal-Tar Products, Dye-and-Tanstuffs, Petroleum Solvents, Fats and Oils, etc.

PRICES CURRENT

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00
March 1941 $1.15 March 1942 $0.964 March 1943 $0.895

	Current Market		1943		1942	
			Low	High	Low	High
Acetaldehyde, 99%, drs. wks. lb.	...	.11	...	.11	.11	.11
Acetic Anhydride, drs. c-l, lb.	...	.11½	.11½	.13	.11½	.13
Acetone, tks, delv (*PC*) .. lb.	...	.07	...	.07	.07	.158
ACIDS						
Acetic, 28%, bbls (*PC*) 100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. .... 100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks .... 100 lbs.	...	6.93	6.25	6.93	6.25	6.93
Acetylsalicylic, USP, (*PC*)						
Standard USP .... lb.	...	.40	...	.40	.40	.40
Benzoic, tech, bbls ...... lb.	.43	.47	.43	.47	.43	.47
USP, bbls .... lb.	.54	.59	.54	.59	.54	.59
Boric, tech, bbls, c-l, ... ton *a*	...	109.00	...	109.00	108.00	109.00
Chlorosulfonic, drs, wks .. lb.	.03	.04½	.03	.04½	.03	.04½
Citric, crys, gran, bbls .. lb. *b*	...	.20	...	.20	.20	.21
Cresylic 50%, 210-215° HB,						
drs, wks, frt equal (A) gal.	.81	.83	.81	.83	.81	.86
Formic, tech, cbys .... lb.	.10½	.11½	.10½	.11½	.10½	.11½
Hydrofluoric, 30% ...... lb.	...	.09	...	.09	.06	.06½
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks .. lb.	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs .. lb.	.25	.26	.25	.26	.25	.26
Muriatic, 18° cbys,						
20° cbys, c-l, wks .. 100 lb.	...	1.75	...	1.75	1.75	1.75
22° cbys, c-l, wks 100 lb.	...	2.25	...	2.25	2.25	2.25
Nitric, 36°, cbys, wks 100 lbs. *c*	...	5.00	...	5.00	5.00	5.00
38°, c-l, cbys, wks 100 lbs. *c*	...	5.50	...	5.50	5.50	5.50
40°, c-l, cbys, wks 100 lbs. *c*	...	6.00	...	6.00	6.00	6.00
42°, c-l, cbys, wks 100 lbs. *c*	...	6.50	...	6.50	6.50	6.50
Oxalic, bbls, wks (*PC*) .. lb.	.11¼	.12½	.11¼	.12½	.11¼	.14½
Phosphoric, 75% USP, .. lb.	.10½	.13	...	.12	.12	.12
Salicylic, tech, wks (*PC*) .. lb.	...	.33	...	.33	...	.33
Sulfuric, 60°, tks, wks .. ton	...	13.00	...	13.00	...	13.00
66°, tks, wks .... ton	...	16.50	...	16.50	...	16.50
Fuming (Oleum) 20% tks.						
wks .... ton	...	19.50	...	19.50	...	19.50
Tartaric, USP, bbls ...... lb.	...	.70½	...	.70½	...	.70½
Alcohol, Amyl (from Pentane)						
tks, delv .... lb.	...	.131	...	.131	...	.131
Butyl, normal, tks (*PC*) lb.	.10¾	.14¼	.10¾	.14¼	.10¾	.168
Denatured, CD, 14, c-l						
drs, (*PC, FP*) .... gal. *d*	...	.54½	.54½	.65	...	.65
Denatured, SD, No. 1, tks. *d*	...	.50	.50	.58	...	.53
Ethyl, 190 proof tks .... gal	...	11.90	11.90	11.92	8.12	11.92
Isobutyl, ref'd, lcl, drs lb.	...	.086	...	.086	...	.086
Isopropyl, ref'd, 91% gal.	.39	.43½	.39	.43½	.40½	.43½
Propyl, nor, drs, wks gal.	.67	.70	.67	.70	.69	.75
Alum, ammonia, lump, c-l,						
bbls, wks .... 100 lb.	...	4.25	...	4.25	...	4.25
Aluminum metal, (*FP*) 100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd 99% wks lb.	.08	.12	.08	.12	.08	.12
Hydrate, 96% light, (A) lb.	...	.15	...	.14½	...	.14½
Sulfate, com, bgs, wks 100 lb.	1.15	1.25	1.15	1.25	1.15	1.25
Sulfate, iron-free, c-l, bgs,						
wks 100 lb.	1.75	1.85	1.75	1.85	1.75	1.85
Ammonia anhyd, 100 lb cyl lb.	...	.16	...	.16	...	.16
26°, 800 lb drs. delv lb.	.02¼	.02½	.02¼	.02½	.02¼	.02½
Ammonium Carbonate, tech,						
bbls .... lb.	.08½	.09¼	.08¼	.09¼	.08¼	.09¼
Chloride, whi, bbls, wks, 100 lb.	4.45	5.15	4.45	5.15	4.45	...
Nitrate, tech. bags. wks. lb.	.0435	.0455	.0435	.0455	.0435	.0455
Oxalate pure, grn, bbls .. lb.	.27	.33	.27	.33	.27	.33
Perchlorate, kgs (A) ... lb.	.55	.65	.55	.65	.55	.65
Phosphate, dibasic tech,						
powd, 325 lb bbls ... lb.	...	.07¼	...	.07¼	.09¼	.09¼
Stearate, anhyd, bbls ... lb.	...	.24½	...	.24½	...	.24½
Sulfate, f.o.b., bulk (A) ton	28.20	29.20	29.00	30.00	29.00	30.00
Amyl Acetate (from pentane)						
c-l, drs, delv .... lb.	...	.155	...	.155	...	.155
Aniline Oil, drs and tks .. lb.	.12½	.16	.12½	.16	.12½	.16
Anthraquinone, sub. bbls .. lb.	...	.70	...	.70	...	.70
Antimony Oxide, 500 lb.						
bbls (A) .... lb.	.15	.15½	.15	.15½	.15	.16½
Arsenic, whi, kgs (A) .... lb.	.04	.04¾	.04	.04¾	.04	.04¾
Barium Carbonate precip,						
200 lb bgs, wks .... ton	55.00	65.00	55.00	65.00	55.00	65.00
Chloride, delv, zone 1 .. ton	77.00	92.00	77.00	92.00	77.00	92.00

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs. less in each case; *d* Prices given are Eastern schedule. *a* Powdered boric acid $5 a ton higher; *b* Powdered citric is ½c higher;

Current Prices

Barytes
Gums

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Barytes, floated, bbls. c-l ton	...	27.65	...	27.65	...	27.65
Bauxite, bulk mines (A) ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde, tech, cbys, dms lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd gal.	(A)	.15	(A)	.15	...	.15
Benzyl Chloride, 95-97% lb.	.22	.24	.22	.24	.22	.24
Beta-Naphthol, bbls, wks .. lb.	.23	.24	.23	.24	.23	.24
Bismuth metal, ton lots ... lb.	...	1.25	..	1.25	.	1.25
BlancFixe, Pulp, bbls, wks ton *h*	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks, 100 lb.	2.50	3.10	2.25	3.10	2.25	3.10
Borax, tech, c-l, bgs .... ton *i*	..	45.00	..	45.00	45.00	46.00
Bordeaux Mixture, drs lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases .. lb.	.25	.30	.25	.30	.25	.30
Butyl, acetate, norm drs, lb.	.124	.1575	.124	.1575	.124	.168
Cadmium Metal (*PC*) lb.	.90	.95	.90	.95	.90	.95
Calcium, Acetate, bgs. 100 lb.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs (A) c-l .... lb.	...	.04¾	...	.04¾	...	.04¾
Carbonate, tech, c-l bgs, ton	18.00	22.00	16.00	20.00	16.00	20.00
Chloride, flake, bgs, c-l .. ton	21.50	25.50	..	21.00	..	21.00
Solid, 650 lb drs, c-l, .. ton	18.00	31.50	18.00	34.50	18.00	34.50
Gluconate, Pharm, drs .. lb.	.52	.59	.52	.59	.52	.59
Phosphate, tri, bbls .... lb.	.0635	.0785	.0635	.0705	.0635	.0705
Camphor, slabs ..... lb.	.85	.90	.85	1.65	1.60	1.65
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Dioxide, Liq, 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, (*FP*) (*PC*) drs, c-l .... lb.	.73	.80	...	.83	.73	.83
Casein, Standard, Dom, grd lb.	.19	.21	.19	.21	.15	.30½
Chlorine, cyls, lcl, wks, contract (*FP*) (A) ..... lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract .. lb. *j*	...	.05¼	...	.05¼	...	.05¼
Liq, tk, wks, contract 100 llb.	...	1.75	...	1.75	...	1.75
Chlorobenzene, Mono, wks lb.	.05½	.09	.05½	.09	.05½	.09
Chloroform, tech, drs .... lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls .... bbl.	8.25	9.25	8.25	9.25	7.50	9.25
Cobalt Acetate, bbls (A) lb.	...	.83¾	...	.83¾	...	.83¾
Oxide, black kgs (A) . lb.	...	1.84	...	1.84	...	1.84
Copper, metal *FP*, *PC* 100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54%, bbls lb.	.19½	.20	.18	.20½	.18	.20½
Sulfate, bbls, wks (A) 100 lb.	5.15	5.30	5.15	5.50	5.15	5.50
Copperas, bulk, c-l, wks .. ton	...	17.00	...	17.00	...	17.00
Cresol, USP, drs, (A) .... lb.	.10¾	.11¼	.10¾	.11¼	.10¾	.11½
Cyanamid, bgs, c-l, frt (A) nitrogen basis .... ton	1.52½	1.62½	1.52½	1.62½	no prices	
Dibutylamine, c-l, drs. wks lb.	...	.61	...	.61	.50	.61
Dibutylphthalate, drs ..... lb.	.20	.212	.21	.23½	.21	.23½
Dichlorethylene, drs ..... lb.	...	.25	...	.25	...	.25
Dichloromethane, drs, wks lb.	...	.23	...	.23	...	.23
Dichloropentanes, c-l, drs lb.	...	.037	...	.037	...	.037
Diethylamine, drs, wks ... lb.	...	.81	...	.81	.70	.81
Diethylaniline, lb drs .... lb.	...	.40	...	.40	...	.40
Diethylphthalate, c-l, drs .. lb.	.212	.217	.212	.217	.21½	.22
Diethyleneglycol, drs lcl. wks. lb.	.14	.15½	.14	.15½	.14	.15½
Diethylene oxide, 50 gal drs, wks .... lb.	.20	.24	.20	.24	.20	.24
Dimethylaniline, dms., cl., lcl. lb.	.23	.24	.23	.24	.23	.24
Dimethyl phthalate, drs .. lb.	.1970	.2000	.1970	.2000	...	.20
Dinitrobenzene, bbls ...... lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls ...... lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms ...... lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks .... lb.	.15	.16	.15	.16	.15	.16
Diphenylamine bbls ...... lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs ... lb.	.35	.37	.35	.37	.35	.37
Ether, Isopropyl, drs .... lb.	.07	.08	.07	.08	.07	.08
Ethyl Acetate, 85% Ester tks, frt all'd . . lb.	.107	.110	.11	.12	.11	.12
Benzylaniline, 300 lb drs lb.	.86	.88	.86	.88	.86	.88
Chloride, drs .... lb.	.18	.20	.18	.20	.18	.20
Ethylene Chlorhydrin, 40% lb.	.75	.85	.75	.85	.75	.85
Anhydrous frt all'd .. lb.	...	.75	...	.75	...	.75
Dichloride, cl wks .... drs, E. Rockies dms, cl. .. lb.	...	.0842	...	.0742	...	.0742
Glycol, dms, cl. .... lb.	...	.15½	...	.15½	.14½	.18½
Oxide, cyl .... lb.	.50	.55	.50	.55	.50	.55
Ferric Chloride, tech, bbls . lb.	.05	.08	.05	.07½	.05	.07½
Fluorspar, 85.5% c-l, (*PC*) ton	25.00	28.00	28.00	32.00	28.00	34.00
Formaldehyde, c-l, bbls, wks (*FP*, *PC*) ...... lb.	.055	.0575	.055	.0575	.055	.0575
Furfural (tech) drs, c-l. wks lb.	..	.12½	..	.12½	..	.12½
Fusel Oil, refd, dms, dlvd lb.	.18½	.19½	.18½	.19½	.18	.19½
Glauber's Salt, bgs, wks 100 lb.	1.05	1.25	1.05	1.25	1.05	1.28
Glycerin (*PC*) CP, drs, c-l, lb.	...	.18¾	...	.18¾	...	.18¼
Saponification, drs, c-l .. lb.	...	.12¾	...	.12¾	...	.12¾

GUMS

Gum Arabic, amber sorts bgs lb.	.16	.17	.16	.17	.14½	.24
Benzoin Sumatra, CS .... lb.	.55	.60	.55	.60	.45	.55
Copal, Congo, opaque .... lb.	...	.49½	...	.49½	...	.49½
Copal, East India, 180 lb bgs Macassar pale bold .... lb.	...	.17⅜	...	.17⅜	...	.17⅜
Singapore, Bold ...... lb.	...	.22⅜	...	.22⅜	. .	.22⅜
Copal Manila, (A)	...	.15⅛	...	.15⅛	.14	.14½
Copal Pontianak, bold (A) lb.	..	.22⅜	...	.22⅜	.22⅜	.22⅞
Ester .... lb.	.09½	.12	...	.10	.08½	.10
Ghatti, sol, bgs .... lb.	.11	.15	.11	.15	.11	.15
Karaya, bbls, bxs, drs ... lb.	.14	.33	.14	.33	.14	.33

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

h Lowest price is for pulp; highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case;

Current Prices

Gums
Salt Cake

		Current Market		1943 Low	1943 High	1942 Low	1942 High
Kauri, N Y (A)							
Brown XXX, cases	lb.	...	.77	...	.77	.60	.77
B3	lb.	...	.22	...	.27½	.18½	.27½
Pale XXX	lb.	...	.65¾	...	.66	.61	.66
No. 3	lb.	...	.22	...	.22	.17¾	.22
Sandarac, prime quality	lb.	...	.97½	.95	.97½	.95	1.10
Tragacanth, No. 1, cases	lb.	4.00	4.25	4.00	4.25	3.50	4.00
No. 3	lb.	1.10	1.20	1.10	1.20	1.10	1.20
Yacca, bgs (*PC*)	lb.	.06	.07¼	.06	.07¼	.06	.07½
Hydrogen Peroxide, cbys	lb.	.16	.18½	.16	.18½	.16	.18½
Iodine, Resublimed, jars	lb.	...	2.00	...	2.00	...	2.00
Lead Acetate, cryst, bbls	lb.	...	.12½	...	.12½	.12	.13½
Arsenate, c-l	lb.	.11½	.12	.11½	.12	.11	.12
Nitrate, bbls	lb.	.11	.12½	.11	.12½	.11	.14
Red, dry, 95% Pb_3O_4, lcl	lb.	.09½	.10½	.09½	.10½	.09	.10¼
97% Pb_3O_4, bbls delv	lb.	.09½	.10¼	.09½	.10¼	.09¼	.09½
98% Pb_3O_4, bbls delv	lb.	.09½	.10¾	.09½	.10¾	.09½	.10½
White, bbls, lcl	lb.	.08¼	.08¾	...	.07½	...	.07½
Basic sulfate, bbls, lcl	lb.	.07¼	.08	...	.07½	.06½	.07½
Lime, Chem., wks, bulk	ton	6.25	13.00	7.00	13.00	7.00	13.00
Hydrated, f.o.b. wks	ton	8.50	16.00	8.50	16.00	8.50	16.00
Litharge, coml, delv, bbls	lb.	.08	.09¾	...	.08	.079	.08
Lithopone, ordi., (*PC*), bgs	lb.	...	.04¾	...	.04¾	...	.04¼
Magnesium Carb, tech, wks	lb.	...	.06¼	...	.06¼	...	.06¼
Chloride flake, bbls, wks c-l	ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, bbls	lb.	.14	nom.	.14	nom.	.13	.14
Dioxide, tech bgs, lcl	ton	70.00	73.00	...	74.75	70.00	74.75
Sulfate, tech, 90-95% drms,	ton *l*	.11¼	.11½	.11¼	.11½	.10½	.11½
Methanol, denat, drs, (*PC*)	gal.	...	.66	...	.66	...	.66
Pure, nat, drs	gal *l*	.55½	.75½	.55½	.61½	.55½	.61½
Synth, pure, drs	gal. *m*	.34½	.40½	.34½	.40½	.34½	.40½
Methyl Acetate, tech tks	lb.	.06	.07	.06	.07	.06	.07
C.P 97-99%, tks, delv	lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, 90 lb cyl	lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd	lb.	...	.08	...	.08	...	.08
Naphtha, Solvent, tks	gal.	...	.27	...	.27	...	.27
Naphthalene, crude, wks	lb.	2.75	3.00	2.75	3.00	2.50	3.00
Nickel Salt, bbls, NY	lb.	.13	.13½	.13	.13½	.13	.13½
Nitre Cake, blk	ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks	lb.	.08	.09	.08	.09	.08	.09
Orthoanisidine, bbls	lb.	...	.70	...	.70	...	.70
Orthochlorophenol, drs	lb.	...	.32	...	.32	...	.32
Orthodichlorobenzene, drms	lb.	.06	.08½	.06	.08½	.06	.07½
Orthonitrochlorobenzene, wks	lb.	.15	.18	.15	.16	.15	.18
Orthonitrophenol, drs	lb.	.85	.90	.85	.90	.85	.90
Orthonitrotoluene, wks	lb.	...	.09	...	.09	...	.09
Para aldehyde, 99%, wks	lb.	...	.12	...	.12	...	.12
Aminophenol, 100 lb kgs	lb.	...	1.05	...	1.05	...	1.05
Chlorophenol, drs	lb.	...	.32	...	.32	...	.32
Dichlorobenzene, wks	lb.	.11	.15	.11	.15	.11	.12
Formaldehyde, drs, wks (*FP*)	lb.	.23	.24	.23	.24	.23	.24
Nitroaniline, wks	lb.	...	.45	...	.45	...	.45
Nitrochlorobenzene, wks	lb.	...	.15	...	.15	...	.15
Nitrophenol, 185 lb bbls	lb.	...	.35	...	.35	...	.35
Penetaerythritol, tech, del	lb.	.33½	.35½	.33½	.35½	.33½	.35½
Toluenesulfonamide, bbls	lb.	...	.70	...	.70	...	.70
Toluidine, bbls, wks	lb.	...	.48	...	.48	...	.48
PETROLEUM SOLVENTS AND DILUENTS							
Lacquer diluents, tks, East Coast	gal.	...	.11	...	.11	...	.11
Naphtha, V.M.P., East tks, wks	gal.	...	.11	...	.11	.10½	.11
Petroleum thinner, 43-47, East, tks, wks	gal.	.08¾	.09½	.08¾	.09½	.08¾	.09½
Rubber Solvents, stand grd, East, tks, wks	gal.	...	.11	...	.11	.10½	.11
Stoddard Solvents, East, tks, wks	gal.	...	.09½	...	.09½	...	.09½
Phenol, 250-100 lb drs (A)	lb.	.10½	.11¼	...	.12½	.12½	.13
Phthalic Anhydride, bbls wks (A)	lb.	.14½	.15½	.14½	.15½	.14½	.15½
Potash, Caustic, wks, sol	lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾
flake	lb.	.07	.07½	.09	.07½	...	.07
Potassium Bichromate csks *(*FP*)	lb.	.09⅝	.10	...	.09⅝	...	.09⅝
Bisulfate, 100 lb kgs	lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 83-85% calc	lb.	.05½	.05¾	.05½	.05¾	.06½	.06¾
liquid, tks	lb.	...	.0275	...	.0275	...	.0275
dms, wks	lb.	.03	.03½	.03	.03⅛	.03	.03⅛
Chlorate crys, kgs, wks (A)	lb.	.11	nom.	nom.	.11	nom.	.11
Chloride, crys, bgs, kgs	lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks	lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans	lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriate, bgs, dom, blk unit	ton	.53½	.56	.53½	.56	.56	.58
Permanganate, USP, crys, wks (*FP*) dms	lb.	.21¾	.22¾	.19¾	.20¼	.19¾	.21
Sulfate, 90% basis, bgs	ton	.	36.25	...	36.25	...	36.25
Propane, group 3, tks (*PC*)	gal.	.03¼	.03¾	.03¼	.03¾	.02¾	.03¾
Pyridine, ref., drms	lb.	...	.46	...	.46	...	.46
R Salt, 250 lb bbls, wks	lb.	...	.55	...	.55	...	.55
Resorcinol, tech., drms, wks	lb.	.68	.74	.68	.74	.68	.74
Rochelle Salt, cryst	lb.	...	.47	...	.47	...	.43½
Salt Cake, 94-96%, wks	ton	...	15.00	...	15.00	...	15.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.

* Spot price is ⅛c higher.

Current Prices

Saltpetre
Oils & Fats

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Saltpetre, grn, bbls ...... lb.	8.20	8.60	8.20	8.60	...	8.20
Shellac, Bone dry, bbls .. lb. r	.42½	.46	.42½	.46	.39	.42½
Silver Nitrate, vials . oz.	...	.32⅜	...	.32⅜	.26⅞	.32⅜
Soda Ash, 58% dense, bgs,						
c-l, wks .... 100 lb.	...	1.15	...	1.15	...	1.15
58% light, bgs 100 lb.	1.05	1.13	1.05	1.13	1.05	1.13
Caustic, 76% grnd						
drms .... 100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms .. 100 lb.	...	2.30	...	2.30	...	2.30
Liquid, sellers tks 100 lb.	...	1.95	...	1.95	...	2.00
Sodium Acetate, 60% tech,						
powd, flake, bbls, wks lb.	.05	.06	.05	.06	...	.05
Benzoate, USP bbls . lb.	.46	.52	.46	.50	.46	.50
Bicarb, bbl, wks ... 100 lb.	1.70	2.05	1.70	2.05	1.70	1.85
Bichromate, cks, wks (*FP*) lb.	...	.07⅜	...	.07⅜	...	.07⅜
Bisulfite, 500 lb bbls, wks lb.	3.00	3.10	3.00	3.10	3.00	3.10
35-40% sol bbls, wks 100 lb.	1.40	1.65	1.35	1.80	1.35	1.80
Chlorate, bgs, wks (A) lb.	...	.06¼	...	.06¼	...	.06¼
Cyanide, 96-98%, wks . lb.	.14	.15	.14	.15	.14	.15
Fluoride, 95%, bbls, wks lb.	...	.08¼	...	.08¼	...	.08
Hyposulfite, bbls, wks 100 lb.	...	2.45	...	2.45	...	2.45
Metasilicate, wks 100 lb.	...	2.50	...	2.50	...	2.50
Nitrate, crude, bgs (A) ton	...	29.35	...	29.35	...	29.35
Nitrite, 500 lb bbls .... lb.	...	.06¾	...	.06¾	...	.06¾
Phosphate, di- wks						
cryst, bgs, c-l .... 100 lb.	2.55	2.70	2.55	2.70	2.55	2.70
Tri-bgs, wks, c-l .. 100 lb.	2.70	3.45	2.70	3.40	2.70	2.85
Prussiate, yel, bbls, wks lb.	.10	.11¼	.10	.11¼	...	.11
Pyrophosphate, bgs wks c-l lb.	.0528	.0610	.053	.061	.053	.06
Silicate, 52°, drs. wks 100 lb.	1.40	1.65	1.40	1.65	...	1.70
40°, drs, wks . 100 lb.	...	.80	...	.80	...	.80
Silicofluoride, bbls NY lb.	.05	.05½	.05	.05½	.09	.15
Sulfate, Anhyd, bgs 100 lb.	1.70	1.90	1.70	1.90	1.70	1.90
Sulfide, c-l, bbls, wks .. lb.	...	2.40	...	2.40	...	2.40
Solid, bbls, c-l, wks . lb.	3.15	3.90	3.15	3.90	...	3.15
Sulfite, powd, bbls, wks lb.	...	.05¼	...	.05¼	...	.05¼
Starch, Pearl, bgs .... 100 lb.	...	3.10	...	3.10	...	3.10
Potato, bgs .... lb.	...	.0637	...	.0637	.061	.0637
Rice, 200 lb bbls ... lb.	.09	.10	.09	.10	.09	.10
Sweet Potato, bbls 100 lb.	nom.	7.00	nom.	7.00	nom.	7.00
Sulfur, crude, f.o.b. mines ton	...	16.00	...	16.00	...	16.00
Flour, com'l, bgs . 100 lb.	1.90	2.40	1.65	1.95	1.65	1.95
Flowers, bgs ...... 100 lb.	3.30	4.15	3.30	4.15	3.05	3.35
Roll, bgs ...... 100 lb.	2.65	3.15	2.40	2.70	2.40	2.70
Sulfur Dioxide, cyl ...... lb.	.07	.08	.07	.08	.07	.09
tks, wks .... lb.	.04	.06	.04	.06	.04	.06
Sulfuryl Chloride .... lb.	.15	.40	.15	.40	.15	.40
Talc, crude, c-l, NY .... ton	...	13.00	...	13.00	12.50	24.50
Ref'd, c-l, NY ...... ton	13.00	18.00	13.00	18.00	17.25	19.25
Tin, crystals, bbls, wks . lb.	.39	.39½	.39	.39½	.39	.39½
Metal, NY (*PC*) (A) .. lb.	...	.52	...	.52	...	.52
Titanium Dioxide (*PC*) .. lb.	.14½	.14¾	.14½	.14¾	...	.14½
Toluol, drs, wks (*FP*) (A) gal.	...	.33	...	.33	...	.33
tks, frt all'd (*FP*) .... gal.	...	.29½	...	.29½	...	.28
Tributyl Phosphate, dms lcl,						
frt all'd ... lb.	...	.47	...	.47	...	.47
Trichlorethylene, dms, wks lb.	(*FP*)	.08	(*FP*)	.08	...	.08
Tricresyl phosphate (*FP*) lb.	.24	.54½	.24	.54½	.25	.31
Triethylene glycol, dms lcl lb.	...	.26	...	.26	...	.26
Trimethyl Phosphate, drs lb.	.54	.56	.54	.56	.54	.56
Triphenyl Phos, drs (*FP*) lb.	.31	.32	.31	.32	.31	.32
Urea, pure, cases .... lb.	...	.12	...	.12	...	.12
Wax, Bayberry, bgs ..... lb.	.25	.26	.18	.20	.18	.20
Bees, bleached, cases .. lb.	.60	.63	.60	.63	.58	.61
Candelilla, bgs ...... lb.	...	.38	...	.38	.33	.38
Carnauba, No. 1, yellow,						
bgs. .... lb.	...	.83¼	...	.83¼	.83¼	.89
Xylol, frt all'd, tks, wks .. gal.	...	.27	...	.27	...	.27
Zinc Chloride fused, wks . lb.	.05	.0535	.05	.0535	...	.05
Metal, high grade slabs, c-l,						
NY (*FP*) (*PC*) 1000 lb.	...	8.66	...	8.66	...	8.65
Oxide, Amer, bgs, wks lb.	.07¼	.07½	.07¼	.07½	...	.07¼
Sulfate, crys, bgs, c-l. 100 lb.	3.60	4.35	3.60	4.35	3.60	3.65

Oils and Fats

Babassu, tks, futures .... lb.	...	.111	...	.111	no prices	
Castor, No. 3, bbls ...... lb.	.13¾	.14¼	.13¾	.14¼	.12½	.13¾
China Wood, drs, spot NY lb.	...	.39	...	.39	.39	.40⅛
Coconut, edible, drs NY .. lb.	...	.0985	...	.0985	...	...
Cod Newfoundland, dms .. gal.	...	.90	...	.90	.85	.90
Corn, crude, tks, mills ... lb.	...	.12¾	.12¾	nom.	.12½	.12¾
Greases, Yellow .... lb.	...	.0929	...	.0929	...	.0929
Linseed, Raw, dms, c-l, spot lb.	.1540	.1620	.1540	.1620	.117	.143
Menhaden, tks, Baltimore gal.	...	.088	...	.089	.63¾	.666
Light pressed, drs ..... lb.	.117	.119	.117	.119	.11	.139
Oiticica, dms .... lb.	.23	.25	.23	.25	.29	.25
Oleo, No. 1, bbls, NY ... lb.	.13¾	nom.	nom.	.13¼	...	.13¼
Palm, Niger kernel, cks						
bulk .... lb.	...	.0825	...	.0825	.0925	...
Peanut, crude, tks, f.o.b. mill lb.	...	.13	...	.13	.12⅞	.13
Perilla, crude dms, NY (A) lb.	...	.245	...	.246	...	.246
Rapeseed, blown, bbls, NY lb.	.18	.18½	.18	.18½	.18	.18½
Red, dms .... lb.	.13¼	.14¼	.13¼	.14¼	.11¾	.143
Soy Bean, crude, tks, mill lb.	...	.1175	.12¼	nom.	.12¼	nom.
Stearic Acid, double pressed						
dist bgs .... lb.	.14½	.15½	.14	.15¾	.14	.16½
Tallow City, extra loose .. lb.	...	.097¼	...	.097¼	...	.097¼
Turkey Red, single, drs .. lb.	.10	.13½	.10	.13½	...	.08¾

r Bone dry prices at Chicago 1c higher: Boston ½c: Pacific Coast 2c; Philadelphia deliveries f.o.b N. Y., refined 6c higher in each case.

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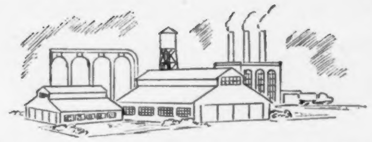

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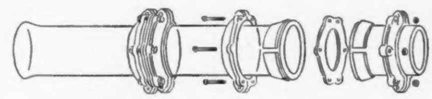

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You may install from one piece to a whole system—for PYREX Piping may be joined to existing metal lines and equipment. And it is hung and supported much like other types of piping. (See photo at bottom of page). We do recommend that hangers and supports be padded, to minimize scratching.

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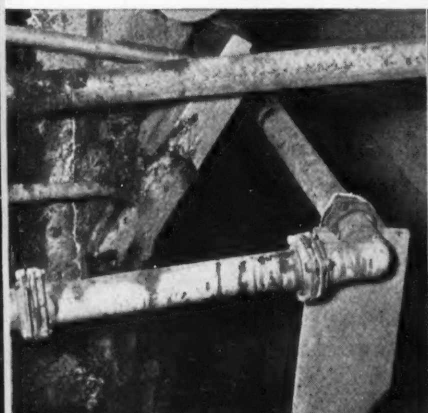
And because PYREX Piping does not wear out under acid attack, it gives long trouble-free service, with resultant low long-time cost.

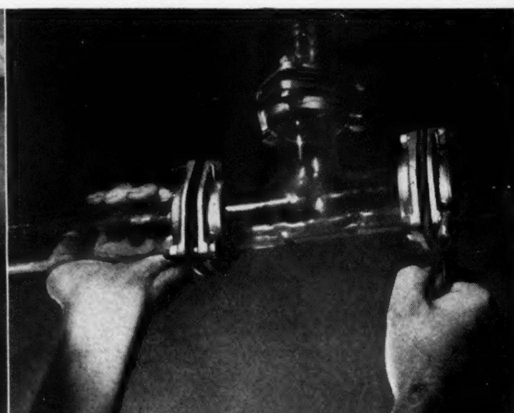
The left-hand photograph at the bottom of the page is an example. That PYREX Piping has carried a slurry of crushed quartz and sulphuric acid for over eight years—without one cent of maintenance.

WATCH FOR CORNING ADVERTISEMENTS!

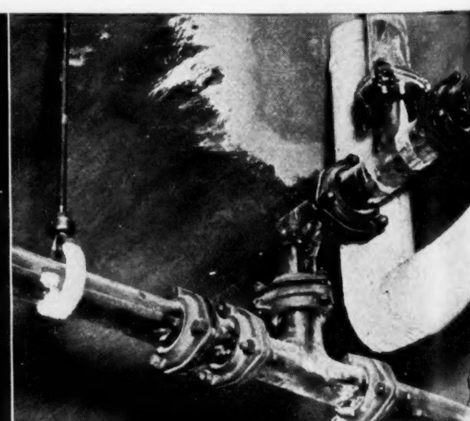
Watch this magazine for more information in Corning's advertisements headed "What every plant operator should know about Glass Piping." And Write for PYREX Piping Bulletin No. 814. Industrial Division, Corning Glass Works, Corning, N. Y. Branch Offices: New York, 718 Fifth Ave.; Chicago, Merchandise Mart.



ılphuric acid and crushed quartz line.



PYREX Piping is easy to install.



Chemical laboratory drain line.

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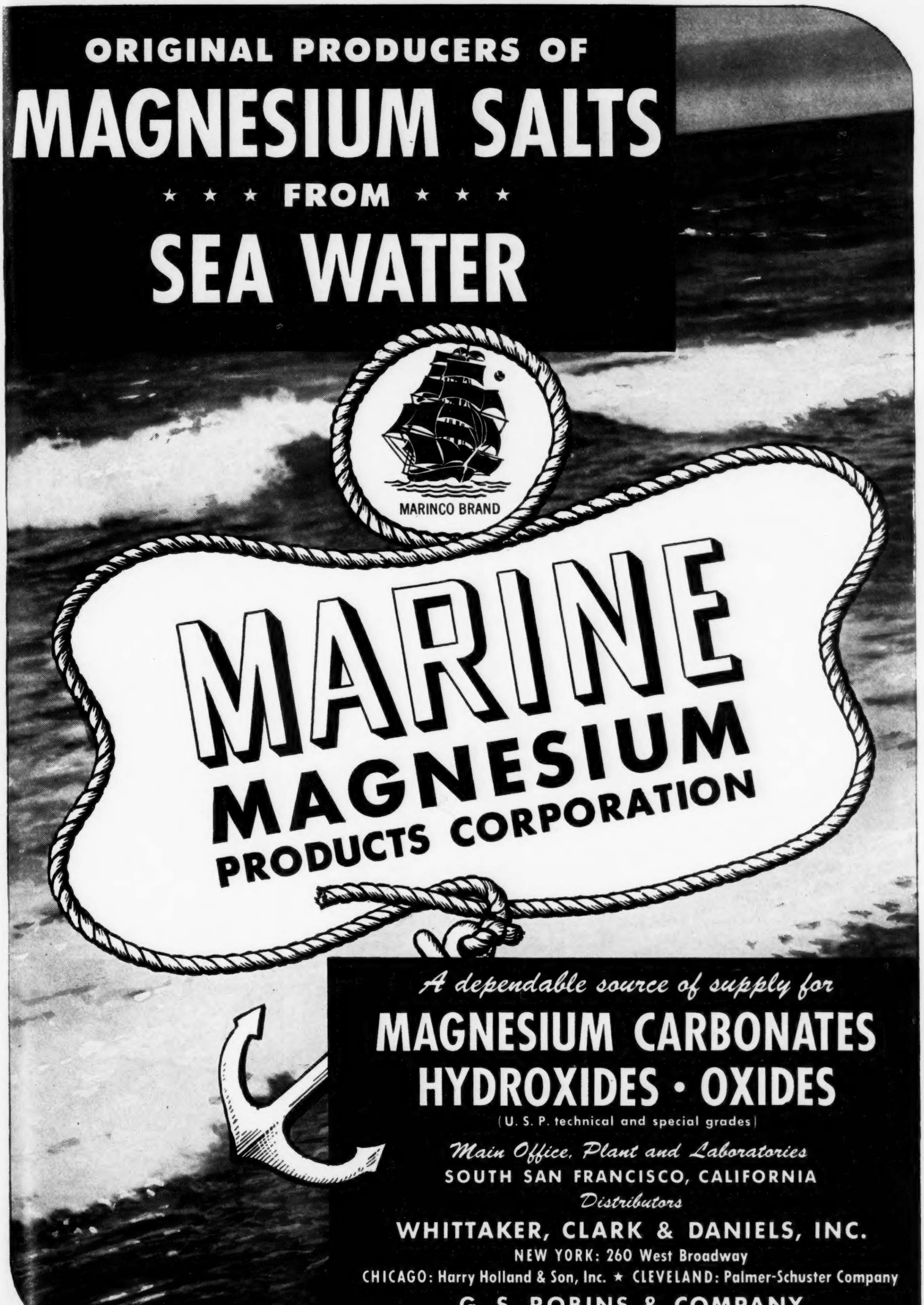
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Index to Advertisers

Index to Advertisers

"WE"-EDITORIALLY SPEAKING

Well, the "flash of genius" is back in the news again. This time it is being treated as it deserves in the National Association of Manufacturers report on the patent system to the National Patent Planning Commission. One of the points of this report being that the "flash of genius" concept be abandoned to recognize the fact that it is entirely inapplicable to the modern method of making inventions and discoveries by intelligent hard work and perseverance in industrial laboratories.

The "flash of genius" idea first reared its head back in 1941 when the Supreme Court handed down a patent decision in which it said; "The new device must reveal the flash of creative genius, not merely the skill of the calling If it fails, it has not established its right to a private grant on the public domain."

It must be said that some courts have rejected this test of patentability. The Chicago Circuit Court of Appeals put it nicely when it said: "We are adhering to the view that all scientific knowledge is built on the step by step advance—the test and error method. Also, we are following the view that invention lies in and must be determined by the product—not in the mental activities or contortions that brought it forth."

We've noted, recently, an increase in the number of articles advocating the establishment and teaching of a world language. It seems only a matter of time that we will have a universal language, whether it be an entirely new one or an outgrowth of one of our present tongues. However it also seems that this will take a long time.

Scientists have gone a long way in getting their terms on a universal basis but still there is much room for improvement. The metric system has proved to be about the best system of measurement yet devised and still it is surprising that, even with scientifically or technically trained people, there is such resistance to the abandonment of other unscientific and complicated systems of measurement. When we start thinking of post war planning, these might be good topics for consideration.

In a recent chat with Harry L. Fisher on the post war outlook for synthetic rubber, he made the following interesting statement, "I think 25%, at least, of the war-time production of synthetic rubber will remain after the war because of its superior qualities for certain applications, regardless of the price at which natural rubber is allowed to come back into the country." We think that, in the midst of all the "globaloney" that has been tossed about on the rubber problem, this is a pretty common-sense viewpoint.

It has been indicated on high authority in Washington that the much-discussed "bedrock" blueprint for curtailing civilian economy should not be taken seriously, at least for the present. This blueprint was only one of many ideas as to what "might" be done. There is no indication that such a program will be carried out or that as yet anyone has been given any directive to proceed along those or any similar lines.

Fifteen Years Ago

From Our Files of April, 1928

American Chemical Society holds seventy-fifth meeting at St. Louis, April 16 to 19. Symposium on atomic structure features discussion.

J. T. Baker Chemical Co. establishes the J. T. Baker Company Fellowship in Analytical Chemistry, to the value of $1,000 annually.

Ansco-Agfa, Inc., is formed at Binghamton, N. Y., March 19, by merger of Ansco Photo Products Co., Agfa Products, Inc., and Agfa Raw Film Corp.

New York Group, Rubber Division, A.C.S. will meet in Town Hall, April 25, at which time there will be an address on "Guayule Rubber," by David Spence.

William Draper Harkins, professor of physical chemistry, University of Chicago, chosen as recipient of the Willard Gibbs Medal for 1928.

Professor Theodore W. Richards, since 1901 head of the chemistry department, Harvard University, and in 1914, winner of the Nobel Prize for special achievement in the field of chemistry, died April 2 at the age of 60.

The national synthetic rubber production program, when in full stride, will use enough soap every day to make "a soap track 25 miles long if made into ordinary laundry-size bars," Dr. Robert V. Yohe of the B. F. Goodrich Company's chemical division, told a meeting of the Society of Automotive Engineers recently. Dr. Yohe cited this and other statistics to illustrate the magnitude of the raw materials problem inherent in making some 900,000 tons of synthetic rubber a year.

On the basis of daily needs, he said, the man-made latex required would fill a tank-car train nearly two miles long, while the main component of that latex, 98.5 per cent pure butadiene—"a material which four years ago was hardly more than a laboratory oddity"—would fill 100 tank cars. To season the gigantic mix will take "a pinch of" 500,000 pounds of common table salt daily!

Given this flow of materials, Dr. Yohe said, "this new industry will need to employ but 10,000 workers to produce as much rubber as some 300,000 coolies could produce in the Far East, but this relatively modest number must be made available.

"At least 500 highly-trained chemists and chemical engineers will be required, and twice that number of highly-skilled craftsmen must be made available," he said. "Many others must be given intensive training."

Have you heard the story of one of our Washington bureaucrats who insisted that operators should be made to "speed up the mining of copper, aluminum and brass"?

We have always wanted to visit a brass mine. Wonder if they have both 60–40 and 70–30 brass mines?

Several hundred tons of guayule rubber the first natural rubber to be produced industrially in the United States are being extracted from a plantation of guayule purchased by the Government in the Salinas Valley of California. Approximately 550 acres, from which a yield of 4,000 tons of shrub is expected, are being harvested. Digging, baling, and trucking the shrub to the factory began in mid-January as the rubber content of the plants is highest during the winter season.

On the basis of small samples already processed, the total yield of this year's harvest is expected to reach approximately 600 tons of rubber, which will be turned over to the Rubber Reserve Co. for allocation to war uses.

A Complete Check-List of Products, Chemicals, Process Industries

Agricultural Chemicals

Separating oil from corn gluten. No. 2,310,184. Herman H. Schopmeyer and Gordon V. Sharps to American Maize-Products Co.
Process for disinfecting seeds. No. 2,309,289. Adolf Zade.
Process and apparatus for decaffeinating coffee. No. 2,309,139. Thomas Rector to General Foods Corp.
Process of decaffeinating coffee. No. 2,309,092. Norton Berry and Roy Walters to General Foods Corp.

Cellulose

Apparatus for making regenerated cellulosic film. No. 2,309,609. Jacques E. Brandenberger and Henry Fenal to E. I. du Pont de Nemours & Co.
Process producing cellulose derivatives. No. 2,310,729. Rudolph S. Bley to North American Rayon Corp.

Ceramics

Producing black glass having a soda-lime silica base. No. 2,309,071. John Sullivan and Chester Austin to Battelle Memorial Institute.
Preparation of selenium ruby glass. No. 2,309,070. Chester Austin and John Sullivan to Battelle Memorial Institute.
Sodium calcium borosilicate glass. No. 2,308,857. Urban E. Bowes to Owens-Corning Fiberglas Corp.
Method and apparatus for surfacing glass. No. 2,309,831. Manson Devol, Philip Crist and Ethmer Haxen to Pittsburgh Plate Glass Co.
Method of firing ceramic ware. No. 2,310,578. Albra H. Fessler and Arthur P. Watts to General Motors Corp.

Chemical Specialty

Fish line floating solution. No. 2,309,052. Frederick Elias to Edward R. Adler.
Shoe stiffener comprising bibulous foundation fabric impregnated with water-free thermoplastic. No. 2,309,023. Adelbert Swett to Beckwith Mfg. Co.
Saponaceous material and oxygen-liberating of washing, cleansing, bleaching and rinsing percompound bleaching agent in undecomposed form. No. 2,308,992. Andreas Mertens to The Procter & Gamble Co.
Concrete preservation using petroleum wax in mixture of tung oil and synthetic phenol formaldehyde resin. No. 2,308,980. Ralph P. Keeler.
Form-Type fire extinguisher. No. 2,308,845. Clifford B. White to American-La France Foamite Corp.
Textile Printing paste. No. 2,308,763. Bunyan H. Little to Hercules Powder Co.
Surface treating composition. An emulsion of wax in aqueous ammoniacal solution. No. 2,308,664. Arthur E. Young and Richard D. Freeman to The Dow Chemical Co.
Lubricating composition containing mineral lubricating oil halogenated polyarylated aliphatic compound. No. 2,308,622. Bert H. Lincoln and Gordon D. Byrkit to The Lubri-Zol Development Corp.
Production of lubricants containing lead soap of hydrogenated ricinoleic acid. No. 2,308,599. Harold M. Fraser to International Lubricant Corp.
Insecticide preparation containing rotenone characterized by inclusion in the powdery insecticide of finely divided "red muds" obtained as a by-product in the manufacture of alumina. No. 2,309,860. Jean Motte and Jean Pomet.
A toilet preparation for dermal application containing as an essential ingredient a polyoxyalkylene glycol of the 1,2 series containing not more than three carbon atoms in each oxyalkylene radical, said polyoxyalkylene glycol having an average molecular weight not less than about 400. No. 2,309,722. Benjamin Wilkes and Helen Wassell to Carbide and Carbon Chemicals Corp.
Lubricating composition containing a salt of a metal of the iron family, said salt being of an acid of phosphorus having an organic substituent. No. 2 310,175. Bruce B. Farrington, James O. Clayton and John T. Rutherford to Standard Oil Co. of Calif. (Corp. of Del.)
A deodorant comprising an aqueous solution of potassium mercuric iodide stabilized with a caustic alkali. No. 2,310,099. Charles E Loetel to Anderson-Stolz Corp.
Dry size and method of making. No. 2,310,005. Ernest S. Wilson to Hercules Powder Co.
Method of treating hair of furskins which comprises applying to the hairs a glyceride of a fatty acid and a solution of formaldehyde, and thereafter applying heat to the hairs for forming a water-insoluble product on said hairs. No. 2,309,907. Paul Krestenbaum
A non-offsetting printing ink. No. 2,309,580. Donald R. Erickson and Paul J. Thoma to Michigan Research Laboratories, Inc.
Fish reduction process comprising treating the fish with a mixture of sodium bisulfate in combination with ferrous sulfate and aluminum sulfate just before the fish enter the cooker. No. 2,309,392. George Henshall.
Fur treating composition and process. No. 2,309,254. William Page
Process which comprises cooking an oil comprised predominantly of oiticica oil in the presence of approximately ⅛ of 1% to 2½% of castor oil. No. 2,310,419. Wells Ginn to Chemical Novelties Corp.
Mineral fortification of foodstuffs and medicinal products. No. 2,310,383. John Andrews, Lacey Evans and Louis Huber to General Mills, Inc.

Gummed body. No. 2,310,292. Ferdinand Humphner to Mid-States Gummed Paper Co.
Impregnating agent for vegetable fibrous materials. No. 2,310,257. Ludwig Ritter to Albi Chemical Corp.
Adhesive tape. No. 2,310,740. Joseph B. Leavy to E. I. du Pont de Nemours & Co.
Lubricant composition. No. 2,310,670. Darwin E. Badertscher, George S. Crandall and Francis M. Seger to Socony-Vacuum Oil Co., Inc.
Soap product having improved hard water characteristics. No. 2,310,475. Richard Thomas and Henry Bowen to Lever Bros. Co.

Coal Tar Chemicals

Production of carbon chloride compound, C_4O_6. No. 2,308,903. Josef Wimmer to Alien Property Custodian.
Process of manufacturing carbon black. No. 2,309,970. Charles E. McKinney to Continental Carbon Co.
Processes for coking carbonaceous material. Nos. 2,309,957, 2,309,958 and 2,309,959. Charles H. Hughes to Hughes By-Product Coke Oven Corp.

Coatings

Grease-proofing paper with aqueous solution of aluminum cellulose glycollate and ammonia. No. 2,308,692. Richard D. Freeman, Floyd C. Peterson and George K. Greminger, Jr., to The Dow Chemical Co.
Corrosion resistant coating for metal surfaces. No. 2,310,239. George Jernstedt to Westinghouse Electric & Mfg. Co.
Coating composition. No. 2,310,867. Earle C. Pitman to E. I. du Pont de Nemours & Co.
Oxychloride coating. No. 2,310,128. George S. Smith.

Dyes, Stains

Improving color in dyed regenerated cellulose film. No. 2,308,732. William D. White to E. I. du Pont de Nemours & Co.
Azo dyestuffs. No. 2,310,181. Neil Mitchill to American Cyanamid Co.
Dyestuffs of the anthraquinone series. No. 2,310,143. Alexander J. Wuertz and Myron S. Whelan to E. I. du Pont de Nemours & Co.
Dyestuffs of the dibenzanthrone series. No. 2,310,087. Edward T. Howell to E. I. du Pont de Nemours & Co.
Method making diazo printing pastes and product. No. 2,310,013. Norman S. Cassel to Interchemical Corp.
Method and composition for producing textile printing emulsions. No. 2,310,012. Norman S. Cassel to Interchemical Corp.
Textile printing with emulsion containing dyestuff reactant. No. 2,309,982. Wm. B. Reynolds and Sylvester A. Scully to Interchemical Corp.
Process for coloration of textile materials containing organic derivatives of cellulose. No. 2,309,176. Henry Dreyfus to Celanese Corporation of America.
Azo compounds and process for coloring. No. 2,309,129. James McNally and Joseph Dickey to Eastman Kodak Co.

Equipment

Hydrocarbon burner. No. 2,309,762. Glenn Gearhart to Alfred Accola.
Sublimation apparatus. No. 2,309,644. Fritz Hansgirg to The Anglo California National Bank of San Francisco.
Apparatus for separating finely divided materials. No. 2,309,923. Milton S. Robertson.
Viscosity measuring device. No. 2,309,910. Hermann Kott to Speedry Gravure Corp.
Fluid proportioning device. No. 2,310,459. Raymond Potter to Western Filter Co.
Liquid level control device. No. 2,310,298. Paul Kuhn and Francis Russell to Standard Oil Development Co.
Catalytic conversion apparatus. No. 2,310,907. Frank M. McMillan to Shell Development Co.
Evaporator. No. 2,310,906. Bernard C. Johnson to Houdaille-Hershey Corp.
Process and apparatus for removing coke from stills. No. 2,310,748. Paul W. Pearson.
Drying apparatus and method. No. 2,310,650. David D. Peebles to Golden State Co., Ltd.
Evaporating apparatus. No. 2,310,649. David D. Peebles to Golden State Co., Ltd.
Colorimeter. No. 2,310,624. Roger S. Estey and Kennard W. Harper to Spencer Lens Co.
Colorimeter. No. 2,310,608. Alva H. Bennett and Roger S. Estey to Spencer Lens Co.
Chemical liquid pressure injector. No. 2,310,576. Eugene W. Dodge to Homer Rhyne and Chauncey Freemont Wentworth.
Gas analyzer. No. 2,310,472. Alan P. Sullivan to Cities Service Oil Co.

Fine Chemicals

Manufacture of compound 10-13,-dimethylcyclopentanopolyhydrophenanthrene series. No. 2,308,835. Leopold Ruzicka and Albert Wettstein to Ciba Pharmaceutical Products, Inc.

Manufacture of compound of 10,13-dimethylcyclopentanopolyhydrophenanthrene series. No. 2,308,834. Leopold Ruzicka and Albert Wettstein to Ciba Pharmaceutical Products, Inc.

3-Keto-cyclopentano-polyhydro-10,13-dimethylphenanthrenes containing carbon double bond and in 17 positions the group CH—R, wherein R is a group which is hydrolizable to hydroxyl. No. 2,308,833. Leopold Ruzicka and Albert Wettstein to Ciba Pharmaceutical Products, Inc.

Lipophilic chemotherapeutical substances being mono-azo compounds of benzene-azo naphthalene series. No. 2,308,640. Ernst Bergmann, Felix Bergmann and Leon Haskelberg.

Derivatives of p-aminobenzenesulfonamide. No. 2,309,870. Arnold Salomon.

Substituted derivatives of saturated or unsaturated pregnandiones. No. 2,309,867. Tadeum Reichstein to Roche-Organon, Inc.

2-aminopyrimidines. No. 2,309,739. Richard Roblin, Jr., and Jackson English to American Cyanamid Co.

Beta-alkoxyguanamines. No. 2,309,681. Jack Thurston and Margaret Bradley to American Cyanamid Co.

Hydroxy-substituted guanamines. No. 2,309,680. Jack Thurston and Donald Kaiser to American Cyanamid Co.

Process of preparing guanamines. No. 2,309,679. Jack Thurston to American Cyanamid Co.

Method of preparing 2-substituted guanamines which comprises reacting a biguanide with a glyceride of an aliphatic acid. No. 2,309,664. Wilbur Oldham to American Cyanamid Co.

Process for preparing substituted guanamines. No. 2,309,663. Wilbur Oldham to American Cyanamid Co.

Method of preparing a carbamylguanamine which comprises reacting a biguanide and an imide of a dicarboxylic acid. No. 2,309,661. Daniel Nagy to American Cyanamid Co.

Beta-alkoxybutyroguanamines. No. 2,309,624. Margaret Bradley to American Cyanamid Co.

Vitamin B_6 intermediate. Nos. 2,310,168-172. Gustaf H. Carlson to Lederle Laboratories, Inc.

Process for synthesizing vitamin B_6. No. 2,310,167. Gustaf H. Carlson to Lederle Laboratories, Inc.

Derivatives of the cyclopentanopolyhydrophenanthrene series and process of making same. No. 2,310,150. Karl Miescher and Albert Wettstein to Ciba Pharmaceutical Products, Inc.

Hydroxy derivatives of sulfonal and its homologues. No. 2,309,937. Hans Dietrick, Fritz Johannessohn, Erich Rebald and Walter Peris to Rare Chemicals, Inc.

Side chain ketones of the cyclopentanopolyhydrophenanthrene series and process of making same. No. 2,309,408. Karl Miescher and Albert Wettstein to Ciba Pharmaceutical Products, Inc.

Derivatives of sulfanilamide and process of preparing same. No. 2,309,248. Jonas Kamlet and Lazar Rosenthal.

Substitution products of anthraquinone and the corresponding aroylbenzoic acid and process of preparing the same. No. 2,309,196. Paul Kranziem to General Aniline & Film Corp.

Ricinoleic acid derivatives. No. 2,310,395. Thomas Carruthers to Carbide and Carbon Chemicals Corp.

Nexane-bis (N-oxtadecylamidomethylene-pyridinium chloride). No. 2,310,873. John C. Sauer to E. I. du Pont de Nemours & Co.

New chemical compound consisting of oxyalkylated phosphatide. No. 2,310,679. Melvin De Groote and Bernhard Keiser to Petrolite Corp., Ltd.

Vitamin preparation for parenteral administration. No. 2,310,479. Hermann Volmer.

Industrial Chemicals

Removing heat from reaction chambers in which exothermic reactions are carried out. No. 2,309,034. Frank Barr to Standard Catalytic Co.

Treating bristles with formaldehyde and amino acid of heratin. No. 2,309,021. Albert Stonehill to Johnson & Johnson.

Preparing ether of a radical of terpene compound and hydrozyl substituted organic radical. No. 2,309,017. Jacob M. Schantz to Hercules Powder Co.

Aluminum stearate solution. No. 2,308,988. Kenneth N. Mathes to General Electric Co.

Bonded abrasive article containing filler alkali metal fluoborate. No. 2,308,983. Samuel S. Kistler to Norton Company.

Abrasive article comprising a bond having as filler potassium calcium sulfate. No. 2,308,982. Samuel S. Kistler to Norton Company.

Abrasive articles. No. 2,308,981. Samuel S. Kistler to Norton Company.

Abrasive article comprising a bond having as filler potassium calcium sulfate. No. 2,308,982. Samuel S. Kistler to Norton Company.

Incorporating gum guaiac in fats. No. 2,308,912. John L. Doegey to Industrial Patents Corp.

Progressive purification of biologically impure liquids. No. 2,308,866. Cecil J. Dekema.

Abrasive article. No. 2,308,854. Carl Barnes to Norton Company.

Preventing reversion of revertible oleaginous materials. No. 2,308,848. Harland H. Young and Howard C. Black to Industrial Patents Corp.

Manufacture of secondary aliphatic monoketomonosulfonates. No. 2,308,841. James H. Werntz to E. I. du Pont de Nemours & Co.

Brazing flux consisting of alkali acid fluoride, alkali boroformate and at least one halogenide. No. 2,308,801.. John Anderson.

Alkylation. No. 308,786. Robert L. Smith to Universal Oil Products Co.

Separating suspension of finely-divided solid in a liquid suspension medium from a liquid of less density. No. 2,308,755. Charles W. Stratford to Standard Oil Co. of Calif.

Means of dispersing one fluid in another fluid. No. 2,305,751. Robert G. Guthrie and Oscar J. Wilbor to Chicago By-Products Corp.

Luminescent silicate of at least one metal and activators. No. 2,308,736. Gunther Aschermann and Hedwig Strrbing to General Electric Co.

Diazoamido compounds. No. 2,308,675. Heinrich Clingestein and Hans Schrum to Winthrop Chemical Co., Inc.

Manufacture of aliphatic compounds. No. 2,308,594. Henry Dreyfus to Celanese Corp. of America.

Hot-aging treatment of maleic anhydride. No. 2,308,588. Joyce H. Crowell to Allied Chemical & Dye Corp.

Hard copolymer consisting of methyl methacrylate and of methacrylic anhydride. No. 2,308,581. Carl E. Barnes to E. I. du Pont de Nemours & Co.

Producing fusible, soluble phenol-formaldehyde condensate. No. 2,308,544. Israel Rosenblum.

Effecting substitution halogenation of olefinic hydrocarbon. No. 2,308,489. Oliver W. Cass to E. I. du Pont de Nemours & Co.

Process for recovery of nitric oxide and hydrocarbons from gaseous mixtures. No. 2,309,845. Edward Hodge to Commercial Solvents Corp.

Process for preparation of new soluble aromatic amido compounds of therapeutic value. No. 2,309,841. Paul Goissedet and Robert Despois.

Sulfur-containing esters. No. 2,309,829. Lloyd Davis, Bert Lincoln, and Gordon Byrkit to Continental Oil Co.

Production of monohalonitromethanes. No. 2,309,806. John Tindall to Commercial Solvents Corp.

Process of producing polyethines or their derivatives. No. 2,309,768. Willy Herrmann, Wolfram Hachnel and Hans Deutsch.

Process for obtaining highly tough and rigid articles composed of high molecular weight synthetic linear polymer. No. 2,309,729. Wallace Gordon to E. I. du Pont de Nemours & Co.

Furyl vinyl ketone and its alpha **alkyl** substituted vinyl analogues. No. 2,309,727. Carl Barnes to E. I. du Pont de Nemours & Co.

Manufacture of anthraquinone derivatives. No. 2,309,708. Henry Olpin, Christopher Argyle and Frank Brown to Celanese Corporation of America.

Preparation of quaternary onium compounds. No. 2,309,691. James Brannon to Bakelite Corp.

Removal of mercaptans from mercaptan-solvent mixtures. No. 2,309,653. Leonard Leum and Edwin Birkhimer to The Atlantic Refining Co.

Removal of mercaptans from mercaptan-solvent mixtures. No. 2,309,654. Leonard Leum and Edwin Birkhimer to The Atlantic Refining Co.

Removal of mercaptans from mercaptan-solvent mixtures. No. 2,309,652. Leonard Leum and Edwin Birkhimer to The Atlantic Refining Co.

Condensation of carbonylic compounds. No. 2,309,650. Sumner McAllister and Vernon Haury to Shell Development Co.

Sublimation refining. No. 2,309,643. Fritz Hansgirg to The Anglo California National Bank of San Francisco.

Method for neutralization of acid sludges. No. 2,309,633. Francis Du Pont and Willing Foulke to Delaware Chemical Engineering Co.

Process of producing toxic material. No. 2,310,194. Jacquelin E. Harvey, Jr., ½ to Southern Wood Preserving Co.

Process for treating pitch. No. 2,310,193. Jacquelin E. Harvey, Jr., ½ to Southern Wood Preserving Co.

Hydrocarbon conversion. No. 2,310,191. Jacquelin E. Harvey, Jr., ½ to Southern Wood Preserving Co.

Conversion of creosote. No. 2,310,191. Jacquelin E. Harvey, Jr., ½ to Southern Wood Preserving Co.

Process for producing solvents. No. 2,310,190. Jacquelin E. Harvey, Jr.

Sublimation refining. No. 2,319,188. Fritz J. Hansgirg to The Anglo California National Bank of San Francisco.

Process and apparatus for treating liquids with sulfur combustion gases. No. 2,310,187. Bernard A. Axelrad and Sheppard T. Powell to Freeport Sulphur Co.

Method and apparatus for providing a controlled supply of sulfur combustion gases. No. 2,310,173. John B. Chatelain and Gordon A. Cain to Freeport Sulphur Co.

Mixed ether-esters of cashew nutshell liquid and preparation. No. 2,310,146. Solomon Caplan to The Harvel Corp.

Method of determining the porosity of materials. No. 2,310,111. Birger W. Nordlander to General Electric Co.

Method for production of capillary active media. No. 2,310,109. Richard Neu to "Unichem" Chemikalien Handels A.-G.

A non-conducting separator for storage battery plates comprising polymerized cashew nut shell liquid. No. 2,310,077. Mortimer T. Harvey to The Harvel Corp.

Guanlyurea salts. No. 2,310,045. Jack T. Thurston and Robert C. Swain to American Cyanamid Co.

Sulfamic acid compounds and process of making same. No. 2,310,038. John B. Rust to Ellis-Foster Co.

Hydraulic setting material comprising a base of calcined gypsum having admixed therewith an auxiliary product comprising calcined gypsum in set condition and Portland cement in set condition. No. 2,310,023. Harry F. Gardner to Certain-teed Products Corp.

Nitrolignin molding composition and process of **making same.** No. 2,310,010. Harry Burrell to Ellis-Foster Co.

Water Purification. No. 2,310,009. Chester L. Baker and Charles H. Dedrick to Philadelphia Quartz Co.

Triazine-aldehyde condensation product. No. 2,310,004. Gustave Widmer and Willi Fisch to Ciba Products Corp.

Process and apparatus for regulating temperature of catalytic masses. No. 2,309,996. Clarence H. Thayer to Sun Oil Co.

Method of treating titanium sulfate solutions. No. 2,309,988. Lonnie W. Ryan and Winfred J. Cauwenberg to Interchemical Corp.

Manufacture of aminodiphenylether sulfonic acids. No. 2,309,969. Henry Martin, Hans H. Zaestin to J. R. Geigy, A. G.

Coated fibro-cement product. No. 2,309,962. Charles E. Kraus.

Production of valuable liquids from liquid and solid hydrocarbons. No. 2,309,954. Jacquelin E. Harvey, Jr., to Southern Wood Preserving Co.

Preparation of mixed esters of polyhydric alcohols. No. 2,309,949. Chester M. Gooding to The Best Foods Inc.

Process for production of chlorine. No. 2,309,919. Donald L. Reed to Henry A. Wallace.
Process for the preparation of 6-hydroxy chromanes. No. 2,309,598. Paul Karrer and Otto Isler to Hoffmann La Roche Inc.
Method for the production of aqueous solutions. No. 2,309,592. Richard Hueter to "Patchem" A.-G. zur Beteiligung an Patenten und sonstigen Erfindungsrechten auf Chemische Verfahren.
Method of separating sodium salts. No. 2,309,569. Leroy G. Black, Elliott B. Fitch and Henry B. Suhr to American Potash & Chemical Corp.
In process for producing a hydrazinoalkylsulfonic acid, the step which comprises heating hydrazine hydrate with a salt of an alkylenesulfonic acid. No. 2,309,562. Hans Zischler and Gustav Wilmanns to General Aniline & Film Corp.
Method of heating and handling liquids. No. 2,309,523. Frank W. Miller to Franclare Co.
Process for the preparation of diamines from ketonitriles and products thereof. No. 2,309,509. Benjamin W. Howk and George W. Rigby to E. I. du Pont de Nemours & Co.
Production of chlorine dioxide by reaction between chlorine and a solid chlorite. No. 2,309,457. Willia Hutchinson and Dale Mecham to the Mathieson Alkali Works, Inc.
Method of concentrating an aqueous solution of an alkali metal hydroxide having a concentration substantially below 65 per cent. No. 2,309,412. Irving Muskat to Pittsburgh Plate Glass Co.
Heat treatment of vinylidene chloride polymers. No. 2,309,370. Jack Williams to The Dow Chemical Co.
Process for preparation of a reagent for use in the treatment of liquids containing undesirable ions such as sulfate, phosphate and fluoride ions for the removal thereof. No. 2,309,366. Oliver Urbain to Charles H. Lewis.
Process for the preparation of a water-insoluble reagent for use in the treatment of potable and polluted liquids to remove tastes, odors and colors therefrom. No. 2,309,365. Oliver Urbain to Charles H. Lewis.
Hydrogen exchange material and process for the preparation thereof. No. 2,309,364. Oliver Urbain and William Stemen to Charles H. Lewis.
Base exchange material and process for the preparation thereof. No. 2,309,363. Oliver Urbain and William Stemen to Charles H. Lewis.
Method of curing gelatinous material stock. No. 2,309,340. Edward Christopher to Industrial Patents Corp.
Production of organic sulfur compounds. No. 2,309,337. Alva Byrns to Union Oil Company of California.
Esters of hydroxypolyaryl methanes and process for preparing same. No. 2,309,335. Herman Bruson to The Resinous Products & Chemical Co.
Recovery of nitrogen bases. No. 2,309,324. Sumner McAllister and Seaver Ballard to Shell Development Co.
Dry lime hydrate and process for producing same. No. 2,309,168. Bolton Corsan to G. & W. H. Corsan, Inc.
Method of refining a dicarboxylic acid anhydride. No. 2,309,167. William Cooper, Jr., to Allied Chemical & Dye Corp.
Beta-o-methoxyphenylpropyl methylamines. No. 2,309,151. Eugene Woodruff to The Upjohn Co.
Beta-p-methoxyphenylpropyl methylamine. No. 2,309,150. Eugene Woodruff to The Upjohn Co.
Azo compounds. No. 2,309,118. William Jones and William Braker to E. R. Squibb & Sons.
Treatment of artificial protein films and filaments. No. 2,309,113. Oskar Huppert to The Glidden Co.
Waterproof abrasive block and method of producing the same. No. 2,309,108. Lloyd Hatch to Minnesota Mining & Mfg. Co.
Manufacture of cellular bodies. No. 2,310,457. William Owen to Pittsburgh Plate Glass Co.
Method of and apparatus for gas analysis. No. 2,310,435. Arthur Jenkins to The Linde Air Products Co.
Luminescent product and method of producing the same. No. 2,310,425. Mac Goodman.
Luminescent composition and method of producing the same. No. 2,310,424. Mac Goodman.
Method of and apparatus for controlling digesters. No. 2,310,415. Webster Frymoyer to The Foxboro Co.
Distillation process and apparatus. No. 2,310,399. Henry Cox and Argyle Plewes to Carbide and Carbon Chemicals Corp.
System for handling abrasive powder. No. 2,310,377. Vandeveer Voorhees to Standard Oil Co.
Polymerization of acyclic terpenes in the presence of a phosphoric acid catalyst. No. 2,310,375. Alfred Rummelsburg to Hercules Powder Co.
Sodium sulfate flotation. No. 2,310,315. David Pye to The Dow Chemical Co.
Preparation of alkyl esters. No. 2,310,283. Edwin Gilliland to Standard Oil Development Co.
Method of making dextran. No. 2,310,263. Grant Stahly to The Commonwealth Engineering Co.
Zirconium oxide opacifier and method of making same. No. 2,310,242. Charles Kinzie to The Titanium Alloy Mfg. Co.

Manufacture of photographic colloids. No. 2,310,228. Bela Gaspar to Chromogen, Inc.
Manufacture of photographic materials. No. 2,310,226. Bela Gaspar to Chromogen, Inc.
Process of isomerization of fats and oils. No. 2,310,225. William Eipper.
Surface-active incrustation inhibitor. No. 2,310,208. Rudolph Bley to North American Rayon Corp.
Surface-active incrustation inhibitor. No. 2,310,207. Rudolph Bley to North American Rayon Corp.
Reissue—Secondary and tertiary 3-aminomethyl-polyhydroxy-phthalides. No. 22,264. Walter Loewe to Walter Neumann.
Hydration of olefins. No. 2,310,911. Henri M. Guinot to Alien Property Custodian.
Method washing nitrocellulose to recover nitrating acids. No. 2,310,862. Friedrich Nessler to Alien Property Custodian.
Method making electrolyte paste. No. 2,310,861. Richard Muller and Harry Lee to Alien Property Custodian.
Process of and apparatus for degasifying liquids and washing gases. No. 2,310,829. Rudolf Becker to Alien Property Custodian.
Method manufacturing oils of high stability. No. 2,310,812. Friedrich Schick to Alien Property Custodian.
Method of preparing diolefins. No. 2,310,809. Walter Reppe, Adolf Steinhofer and Guenther Daumiller to Alien Property Custodian.
Linear polymeric amidine salts. No. 2,310,789. Madison Hunt and James E. Kirby to E. I. du Pont de Nemours & Co.
Process for preparation of gas mixtures for catalytic processes. No. 2,310,784. Wilhelm Herbert to Alien Property Custodian.
Vinyl esters of tertiary carboxylic acids. No. 2,310,780. Wm. E. Hanford and Walter E. Mochel to E. I. du Pont de Nemours & Co.
Production of aromatic vinyl compounds. No. 2,310,762. Guenther Daumiller and Gunthard Hoffmann to Alien Property Custodian.
Recovery of low-boiling organic compounds from coke oven by-products. No. 2,310,659. Frederick M. Thatcher, Joseph H. Wells and Philip J. Wilson, Jr., to Carnegie-Illinois Steel Corp.
Cell cover with electrolyte control. No. 2,310,656. McConnell Shank to The Richardson Co.
Process and composition for purification and treatment of natural or sewerage waters. No. 2,310,655. Phillip C. Schneider to Paul B. Joyce.
Starch manufacturing process. No. 2,310,651. Albert Peltzer and Albert Peltzer, Jr., to Merco Centrifugal Co.
Production of compounds of the cyanine type. No. 2,310,640. John D. Kendall to Ilford, Ltd.
Separation of metacresol and paracresol. No. 2,310,616. Francis E. Cislak and Merritt M. Otto to Reilly Tar & Chemical Corp.
Fused cast refractory article composed of 15 to 40% **magnesia,** 50 to 80% lime and 5 to 20% iron oxide. No. 2,310,591. John C. McMullen to The Carborundum Co.
Method joining a beryllium member to a base member of metal other than beryllium. No. 2,310,568. Zed J. Atlee and Howard Brackney to General Electric Co.
Fractional distillation of tar. No. 2,310,500. Joseph Zavertnik to Allied Chemical & Dye Corp.
Process for treatment of methylamines. No. 2,310,478. Wm. Tyerman to Imperial Chemical Industries, Ltd.

Leather

Process of tanning hides. No. 2,309,187-188. John Marshall Grim and William Dawson to American Cyanamid Co.

Metals, Alloys

Synthetic ore comprising fine iron-oxide containing. No. 2,308,984. Hobart M. Kraner to Bethlehem Steel Co.
Recovering magnesium scrap. No. 2,308,938. Vincent E. Shulnburg.
Manufacture of metal powder by atomization. No. 2,308,584. George E. Best to The New Jersey Zinc Co.
Welding alloy. No. 2,310,104. William C. McLott.
Process separating ore particles in gravity separating mediums. No. 2,309,931. Shelton T. Cameron to Minerals Beneficiation, Inc.
Nonleafing aluminum paste and method of making same. No. 2,309,377. Gordon Babcock to Reynolds Metals Co.
Process for preparing an alloy for cast dentures. No. 2,309,136. Robert Neiman to Edmund A. Steinbock.
Copper base alloys. No. 2,309,100-103. Donald Crampton, Marion, and Henry Burghoff to Chase Brass & Copper Co., Inc.
Process of coating metal articles with molten metal and of preparing metal articles for hot coating. No. 2,310,451. William Marshall to The American Rolling Mill Co.
Treatment of ferrous bearing metals. No. 2,310,381. John Zimmer and Arnold Morway to Standard Oil Development Co.
Rustless Iron. No. 2,310,341. William Arness to Rustless Iron and Steel Corp.
A welding rod for welding manganese steel. No. 2,310,308. Raymond Morrison to Morrison Railway Supply Corp.
Process recovering manganese from ore. No. 2,310,258. Elfego Riveroll.
Froth flotation process which comprises agitating an aqueous suspension of an oxidized metallic sulfide ore in the presence of a mahogany sulfide ore in the presence of a mahogany sulfonate to collect the metal bearing ore at the surface of said suspension. No. 2,310,240. Walter Keck.
Brazing solder. No. 2,310,231. Melvin Goldsmith to Goldsmith Bros. Smelting & Refining Co.
A corrosion resistive alloy having a surface formed of a multitude of galvanic couples. No. 2,310,214. Louis Canac and Emile Segol to Societe "Alliages Autoproteges," Paris (Seine), France.
Process for effecting metallurgical reactions regularly and rapidly. No. 2,310,865. Rene Perrin to Alien Property Custodian.
Method treating steel. No. 2,310,703. Lloyd F. McGlincy to The American Steel & Wire Co. of New Jersey.
Malleable cast iron. No. 2,310,667. Nicholas A. Ziegler and Homer W. Northrup to Crane Co.
Malleable cast iron. No. 2,310,666. Nicholas A. Ziegler and Homer W. Northrup to Crane Co.
Degreasing metal articles. No. 2,310,569. Wm. E. Booth to Imperial Chemical Industries, Ltd.
Coloring protective coating on magnesium and its alloys. No. 2,310,487. Herbert K. de Long to The Dow Chemical Co.
Recovery of volatile metals. No. 2,310,471. Ernest W. Steckel and George T. Hahler to The New Jersey Zinc Co.

Paint, Pigments

Water paint of brushing consistency. No. 2,308,879. Eugen Hirsch to E. I. du Pont de Nemours & Co.
Producing pigment-form of pigmentry anthraquinone vat dyestuff. No. 2,308,711. Grady M. O'Neal to The Sherwin-Williams Co.
Process of making a drying oil which comprises heating castor oil with not more than a few per cent of an alkali metal pyrosulfate, to over 150° C., until an oil having drying properties is produced. No. 2,309,273. Remmet Priester.
Black ceramic pigments and method of preparation. No. 2,309,173. Heinrich Diehl.
Method producing pigment substance which comprises dissolving alum in water, dissolving sulfur dioxide in resulting alum solution, adding solution of alum and sulfur dioxide to a milk of lime suspension. No. 2,310,693. Gerald Haywood to West Virginia Pulp & Paper Co.

Paper and Pulp

Treatment of paper with phenol to retard rancidity. No. 2,309,079. Harold Mitchell to Industrial Patents Corp.
Recovery of cellulose and lignin from wood. No. 2,308,564. Ralph H. McKee.
Production of lignite briquettes. No. 2,310,095. Ernest T. Lance and William L. Wells.
Method treating normally water permeable paper of relatively low wet strength in order to increase its wet strength. No. 2,309,090. Jordan Bauer and Don Hawley to Stein, Hall Mfg. Co.

Petroleum

Purifying waste water from oil refineries and oil wells containing organic impurities with chlorine. No. 2,309,062. William Graham to Richfield Oil Corp.
Making organic compounds from olefinic hydrocarbon gases. No. 2,308,856. Edmund G. Borden to Cities Service Oil Corp.
Catalytic conversion of hydrocarbon oil to produce high antiknock gasoline. No. 2,308,792. Charles L. Thomas to Universal Oil Products Co.
Treatment of gasolines subject to deterioration by adding N-methyl-N-octyl aminophenols. No. 2,308,783. Robert H. Rosenwald and Joseph A. Chenicek to Universal Oil Products Co.
Treatment of gasolines subject to deterioration by adding N-methyl-N-heptyl-aminophenols. No. 2,308,782. Robert H. Rosenwald and Joseph A. Chenicek to Universal Oil Products Co.
Treatment of gasolines subject to deterioration by adding N-methyl-N-hexyl-aminophenols. No. 2,308,781. Robert H. Rosenwald and Joseph A. Chenicek to Universal Oil Products Co.
Treatment of gasolines subject to deterioration by adding N-methyl-N-amyl-aminophenols. No. 2,308,780. Robert H. Rosenwald and Joseph A. Chenicek to Universal Oil Products Co.
Converting hydrocarbon oils into gasoline of high knock rating. No. 2,308,774. Alex G. Oblad and Llewellyn Heard to Standard Oil Co. (Corp of Ind.)
Process for refining turpentine. No. 2,308,715. Jesse O. Reed to people of U. S.
Beneficiated mineral oil consisting of oil of lubricating viscosity and 4-aminodiphenylamine. No. 2,308,691. Everett C. Hughes to The Standard Oil Co. of Ohio. (Corp of Ohio)
Beneficiated mineral oil consisting of oil of lubricating viscosity and of tolidine. No. 2,308,690. Everett C. Hughes to The Standard Oil Co.
Production of aviation gasoline of high octane number and balance volatility characteristics. No. 2,308,562. Robert F. Marschner and Don R. Carmody to Standard Oil Co. (Corp. of Ind.)
Alkylating isoparaffinic hydrocarbons with olefinic hydrocarbons. No. 2,308,561. Robert F. Marschner and Don R. Carmody to Standard Oil Co. (Corp. of Ind.)
Converting isoparaffinic hydrocarbons into hydrocarbons of higher molecular weight. No. 2,308,560. Don R. Carmody and Edmond L. d'Ouville to Standard Oil Co. (Corp. of Ind.)
Cracking hydrocarbon distillate in admixture with powdered cracking catalyst. No. 2,308,557. Kenneth M. Watson to Universal Oil Products Co.
Hydrocarbon lubricating oil and metal salt of alkyl carboxylic acid. No. 2,308,503. Bruce B. Farrington, James O. Clayton and Dorr H. Etzler to Standard Oil Co. of Calif. (Corp. of Del.)
Hydrocarbon lubricating oil subject to deterioration, and metal alkyl monocarboxylate. No. 2,308,502. Bruce B. Farrington, James O. Clayton and Dorr H. Etzler to Standard Oil Co. of Calif. (Corp. of Del.)
Recovering lubricating oil from liquid hydrocarbon mixture. No. 2,308,490. Herbert S. Chase and George C. Caine ¾ to Tide Water Associated Oil Co.
Treatment of hydrocarbon fluids. No. 2,309,871. Walter Schulze and Graham Short to Phillips Petroleum Co.

Method of making geophysical explorations. No. 2,309,817. Lawrence Athy and Elton McCollum to Continental Oil Co.
Method of preparing high boiling hydrocarbons. No. 2,309,718. Carlisle Thacker to The Pure Oil Co.
Treatment of hydrocarbon oil. No. 2,309,651. James McCullough and Edwin Birkhimer and Leonard Leum to The Atlantic Refining Co.
Cracking hydrocarbon oil. No. 2,310,183. Joseph K. Roberts and Morris T. Carpenter to Standard Oil Co. (Corp. of Ind.)
Polymerization of olefins and catalyst therefor. No. 2,310,161. Edwin T. Layng to The Polymerization Process Corp.
Treatment of hydrocarbon oils. No. 2,310,123. Jean Delattre to Universal Oil Products Co.
Method refining sulfate turpentine and tall oil. No. 2,310,046. Floyd Trimble to The Quaker Oats Co.
Process breaking petroleum emulsions. No. 2,309,935. Edwin E. Clyator to Petrolite Corp.
Process which comprises treating tall oil unsaponifiable material having a boiling point not less than 60° C. at 5 mm. pressure, with hydrogen in the presence of a hydrogenation catalyst and at an elevated temperature. No. 2,309,483. Joseph A. V. Truck, Jr., to Colgate-Palmolive-Peet Co.
In a process of producing acrolein, the steps of subjecting diallyl ether to thermal non-catalytic pyrolysis at a temperature of between about 550° C. and about 600° C., and recovering acrolein from the reaction products. No. 2,309,576. Willard B. Converse to Shell Development Company.
Method of coking a reduced crude petroleum oil. No. 2,309,540. Walter F. Rollman and Leonard S. Bonnell to Standard Oil Development Co.
Addition agent for lubricating oils. No. 2,309,336. Gordon Byrkit to Continental Oil Co.
Process for the production of catalysts. No. 2,309,263. Samuel Thomas to Shell Development Co.
Process for breaking petroleum emulsions. No. 2,309,243. Melvin De Groote and Bernhard Keiser to Petrolite Corp., Ltd.
Catalytic conversion of hydrocarbons. No. 2,308,137. Albert Peterkin to Houdry Process Corp.
Conversion of tars and similar residues into commercial fuel oils. No. 2,309,112. Eugene Houdry and Albert Peterkin to Houdry Process Corp.
Motor fuel. No. 2,310,376. William Smyers and Thomas Cross, Jr., to Standard Oil Development Co.
Method of producing gasoline having low acid heat, high octane number lead response by conversion of higher boiling hydrocarbons. No. 2,310,327. William Sweeney to Standard Oil Development Co.
Combination coking and catalytic cracking process. No. 2,310,317. Joseph Roberts to Standard Oil Co.
Method of treating diesel fuels. No. 2,310,306. Pharis Miller and Eugene Lieber to Standard Oil Development Co.
Method and means for purifying lubricants. No. 2,310,305. Pharis Miller and Eugene Lieber to Standard Oil Development Co.
Hydrogenating with catalyst. No. 2,310,278. Gerald Connolly to Standard Catalytic Co.
Method fractionally distilling wherein a petroleum oil is fractionally distilled in presence of steam and ammonia. No. 2,310,837. John H. Carpenter, Robert B. Kennedy and Harry J. McClanahan to Socony-Vacuum Oil Co., Inc.
Process for stabilizing olefin-containing hydrocarbon oils in regard to their desirable properties. No. 2,310,710. Robert H. Rosenwald and Joseph A. Chenicek to Universal Oil Products Co.
Process treating pipeline oil. No. 2,310,673. Charles M. Blair to Petrolite Corp., Ltd.
Production of alkylated phenols. No. 2,310,663. Wm. Whitney Weinrich and Edward J. Loew to Gulf Research & Development Co.
Method polymerizing and cracking petroleum hydrocarbons. No. 2,310,630. Wm. T. Hancock.
Solvent extraction of hydrocarbon materials. No. 2,310,524. Robert W. Henry and James V. Montgomery to Phillips Petroleum Co.
Process for production of diolefins. No. 2,310,523. Herbert P. A. Groll, George W. Hearne and George E. G. von Steitz to Shell Development Corp.

Resins and Plastics

Article of resin bonded abrasive grains. No. 2,308,853. Carl E. Barnes to Norton Company.
Water insoluble resinous condensation products of semicarbazide with formaldehyde. No. 2,308,696. Frederick L. Johnston to E. I. du Pont de Nemours & Co.
Forming ester bodies selected from drying oil-natural varnish resin composites and drying oil modified alkyl resins. No. 2,308,498. Kenneth A. Earhart and Benjamin Rabin to Devoe & Raynolds.
Interpolymerization product of unsaturated alkyd resin and a monoallyl ester of a nonvinylic monoesterifiable acid. No. 2,308,495. Gaetano F. D'Alelio to General Electric Co.
Interpolymerization product of polycrotyl ester and unsaturated alkyd resin. No. 2,308,494. Gaetano F. D'Alelio to General Electric Co.
Sulfur polymer plastic compositions. No. 2,309,692. Martin Chittick and Paul McKinney to The Pure Oil Co.
Water-soluble phenolic resin and process of making same. No. 2,309,610. Harry Burrell to Ellis-Foster Company.
Manufacture of molding compounds. Barnard M. Marks to E. I. du Pont de Nemours & Co.
Diiodotyrosin solutions. No. 2,309,404. Kurt Kraft and Ferdinand Dengel to Bilhuber, Inc.
Process for producing protein plastics. No. 2,309,380. George Brother and Leonard McKinney.
Non-crystallizing rosin size and method of making same. No. 2,309,346. Chester Landes and Jack Cassaday to American Cyanamid Co.
Method of making moldable thermosetting compositions. No. 2,309,342. Harry Dent, Sydney Hall and Lothar Sontag to Durez Plastics & Chemicals, Inc.
Manufacture of modified resin. No. 2,309,088. Laszlo Auer.
Polymerization of rosin and rosin esters. No. 2,310,374. Alfred Rummelsburg to Hercules Powder Co.
Method of plasticizing a film of cellulose ester especially adapted to be applied as a covering for aircraft propellers. No. 2,310,272. George Adlington to Rayoid Mfg. Co., Ltd.
Method of hardening a photographic resin containing the resin with a solution of a zirconium salt. No. 2,310,223. George Eaton and John Crabtree to Eastman Kodak Co.
Vinyl resin composition and articles of manufacture comprising same. No. 2,310,889. Leonard Becker to S. Buchsbaum & Co.
Resins from fused urea. No. 2,310,794. Otto L. Kupfer to Stein, Hall & Co., Inc.
Interpolymers of diallyl itaconate and ethyl methacrylate. No. 2,310,731. Gaetano F. D'Alelio to General Electric Co.
Production of sulfur dioxide-olefin resins. No. 2,310,605. Maxwell M. Barnett to Freeport Sulphur Co.
Recovering resins from coal. No. 2,310,492. Adriaan Nagelvoort.

Rubber

Making sponge rubber. No. 2,309,005. Steward Ogilby to United States Rubber Co.
Vulcanizing cellular rubber made from latex. No. 2,308,970. Mitchell Carter to The Firestone Tire & Rubber Co.
Forming aqueous dispersion of rubber. No. 2,308,958. Harry R. Williams to The Firestone Tire & Rubber Co.
Article of dipped vulcanized rubber and superimposed dipped layers of natural rubber and synthetic rubber bonded together. No. 2,308,724. Paul Stamberger to Internation Latex Corp.
Rubber hydrochloride composition. No. 2,309,932. James P. Chittum, George E. Hulse to U. S. Rubber Co.
Age resisting rubbery material and method of making. No. 2,310,449. Irving Lightbown and John McNab to Jasco Inc.
Lacquer coated vulcanized rubber product. No. 2,310,676. Paul L. Bush and Dale E. Lovell to Mishawaka Rubber & Wollen Mfg. Co.

Textile

Pre-treating moire fabrics with water-insoluble resin dissolved in volatile solvent prior to finishing with dispersions of finishing agents. No. 2,315,600. Celanese Corp of America.
Textile fabric embodying a dye imparting a desired ground color to the fabric, a design comprising a discontinuous film comprising 10 to 15 parts of urea-formaldehyde resin in final stage of hardening upon the fabric, the film containing 6 to 15 parts sebacic acid, modified alkyd resin as a plasticizer, and 30 to 65 parts of pigment, rendering the film opaque to the ground color and contrasting with said color. No. 2,310,436. Melvin Johnson to Pittsburgh Plate Glass Co.
Method of producing artificial filaments of a glycinin derivative which comprises dispersing glycinin in an alkaline solution in the presence of a hydroxyalkyl sulfoxylate, spinning the resulting dispersion in an acidic spinning bath, and collecting from the spinning bath the resulting filaments of precipitated glycinin alkyl sulfoxylate. No. 2,310,221. Russell Denyes to Tubize Chatillon Corp.
Emulsion for treating textiles. No. 2,310,795. Fred G. La Piana and Herman S. Bosland to Stein, Hall & Co., Inc.
Process for shrinking textile fabrics. No. 2,310,664. Frances E. Mason to The Yorkshire Dyeing & Proofing Co., Ltd.
Reissue treatment of casein fibers. No. 22,262. Theodoor Koch and Henrieus van der Kroon to American Enka Corp.
Process for matting of textiles. No. 2,309,964. Albert Landolt to Society of Chemical Industry in Basle.

Abstracts of Foreign Patents

Collected from Original Sources and Edited

Those making use of this summary should keep in mind the following facts:

Belgian and Canadian patents are not printed. Photostats of the former and certified typewritten copies of the latter may be obtained from the respective Patent Offices.

English *Complete Specifications Accepted* and French patents are printed, and copies may be obtained from the respective Patent Offices.

In spite of present conditions, copies of all patents reported are obtainable, and will be supplied at reasonable cost.

This digest presents the latest available data, but reflects the usual delays in transportation and printing Your comments and criticisms will be appreciated.

CANADIAN PATENTS

Granted and Published November 17, 1942. (Cont.)

Method of storing elongated bats of loosely matted mineral wool fiber usable building insulation. No. 408,673. Canadian Gypsum Company Limited. (Joseph R. Parsons).

Preparing stable polyvinyl acetal resin by condensing an aldehyde with a hydrolyzed polyvinyl ester in contact with polyhydroxybenzene in an amount between approximately 2% and approximately 6% based on the weight of the polyvinyl ester. No. 408,674. Canadian Kodak Company Limited. (Joseph B. Hale).

Heat exchanger for liquids. No. 408,689. Cherry-Burrell Corporation. (Charles B. Dalzell and Ellsworth Wyman).

Heat exchange element. No. 408,690. Cherry-Burrell Corporation. (Charles B. Dalzell and Ellsworth Wyman).

Apparatus for liquid clarification. No. 408,692. Compañía de Ingenieros Petree y Dorr. (William C. Weber, William E. Geissler and Miguel de Arango).

Process for preparing new quaternary amino-acetic acid amide derivatives. No. 408,694. J. R. Geigy A. G. (Henry Martin, Kurt Glatthaar and Walter Stammbach).

Preparing cereal product from whole grain by rupturing the bran coat of kernels, gelatinizing the starch therein, subjecting the gelatinized starch within the individual kernels to the action of added starch splitting enzyme to convert the greater part thereof to dextrins and sugars, cooking the treated grain to inactivate the enzyme, shaping the cooked grain to the desired physical form, and toasting the shaped grain. No. 408,696. General Foods Corporation. (Morris S. Fine and Willard L. Roberts).

Plasticizer prepared by incorporating with a polyvinyl halide a member of the class consisting of esters, ketones, and ethers containing a tetrahydrofurfuryl group attached directly to the determining group. No. 408,697. The B. F. Goodrich Company. (Claude H. Alexander).

Method of preparing progressive-burning double base smokeless powder. No. 408,702. Hercules Powder Company. (Ellsworth S. Goodyear).

Coating smokeless powder grains with a deterrent soluble in water. No. 408,703. Hercules Powder Company. (Floyd L. Boddicker).

Method of preparing a progressive-burning smokeless powder. No. 408,704. Hercules Powder Company. (Harold M. Spurlin and Gustave H. Pfeiffer).

Producing a reaction product of an aldose sugar containing at least five carbon atoms and ammonia. No. 408,705. Hercules Powder Company. (Eugene D. Klug).

Clay bound soil substantially resistant to displacement when wet containing bitumen adsorbed on the surfaces of the soil particles, the interstices of said soil being substantially free of unadsorbed bitumen. No. 408,706. International Bitumen Emulsions Corporation. (Claud L. McKesson and Vilas E. Watts).

Process for the catalytic conversion of hydrocarbons. No. 408,710. The M. W. Kellogg Company. (Arnold Belchetz).

Apparatus for the catalytic conversion of hydrocarbons. No. 408,711. The M. W. Kellogg Company. (Lewis E. Nofsinger).

Link mechanism for pressure casting machine. No. 408,714. Lester Engineering Company. (Nathan Lester).

Nozzle shut-off for pressure casting machine. No. 408,715. Lester Engineering Company. (Nathan Lester).

Method of puffing maize comprising subjecting it in the presence of salt to substantial superatmospheric temperature and to substantial superatmospheric external pressure by means of steam, and then suddenly very greatly reducing such external pressure. No. 408,726. Quaker Oats Company. (William J. Plews).

Electrode material comprising a metal body having a surface layer composed of a solid solution of a metal carbide in a non-carbide-forming metal. No. 408,729. Raytheon Production Corporation. (John Wulff).

Hard, dense, non-porous molybdenum make-and-break contact containing approximately 1% boron. No. 408,734. Samuel Ruben.

Treating fish press liquor with an alum to precipitate coagulable protein matter and proteolytic enzymes therefrom, and recovering from the resultant supernatant liquid a product rich in vitamins. No. 408,740. Philip R. Park, Inc. (Sven H. Lassen).

Packing material for keeping fresh shell fish comprising a layer of freshly dried sawdust, moistened with fresh, cold, seawater, and a layer of seaweed, the fresh, live animal being held between the two layers. No. 408,745. Joseph R. Macdonald. (Robert V. Stevens).

Method of looping by hand polychrome yarn of repeating pattern which comprises the steps of predetermining the average length of yarn required for a single stitch that goes into the fabric, and then forming the stitches. No. 408,746. Herman Epstein. (Florence D. Leech).

Manufacture of artificial straw-like materials. No. 408,749. Camile Dreyfus. (George Schneider).

Reclaiming rubber by a process comprising introducing vulcanized rubber scrap into a liquid bath of bituminous material, heating the whole to a uniform temperature within the range of about 180-225°C. and continuing the heating for a period of from 30 to 60 minutes. No. 408,751. Rubber & Plastics Compounds Company, Inc. (Henry Ghez and Oscar Gehz).

Process for the manufacture of tapes, sheets and the like of insulating material for electrical applications. No. 408,753. Northern Electric Company Limited. (John K. Webb).

Producing pigment dyestuffs by heating a derivative of an aromatic orthodicarboxylic acid selected from the class consisting of dinitriles and orthocyanamides with an amide, said amide being a compound different from said aromatic orthodicarboxylic acid derivative. No. 408,755. Fritz Muehlbauer.

Granted and Published November 24, 1942.

Apparatus for moistening paper, fabrics or similar material in web form. No. 408,760. Carl Gustav Anderson.

Renewable rubber heel structure. No. 408,761. John F. Anderson.

Process for the manufacture of artificial filaments by spinning a solution of cellulose acetate. No. 408,768. Henry Dreyfus.

Process for controlling codling moth in the larval and pupal or cocoon stages. No. 408,769. Charles B. Gnadinger.

Heat-enduring alloy containing chromium 21-29%, nickel 11-14%, nitrogen 0.02-0.15%, with the carbon plus one-half the nitrogen from 0.26-0.45% and the balance substantially iron. No. 408,786. Allo Casting Institute. (Oscar E. Harder and James T. Gow).

Apparatus for continuously casting metal. No. 408,789. American Smelting and Refining Company. (Jesse O. Betterton and Frank F. Poland).

Treating germanium-bearing material by leaching the material to yield a germanium-bearing solution, incorporating tannic acid in said solution, and filtering the resulting mixture. No. 408,790. American Smelting and Refining Company. (Clarence Zeschkau).

Preparing water soluble extract of high potency of Vitamin B_1 and other factors of the vitamin B complex by extracting natural cereal products containing vitamin B_1 and other factors of the vitamin B complex with cold water, adding a filtering aid and filtering the mixture. No. 408,799. The Borden Company. (George C. Supplee, George E. Flanigan and Raymond C. Bender).

Electrostatic coating method comprising dipping an article to be coated in liquid coating material, subjecting the coated article to the action of an electrostatic force while the coating material is still liquid, and thereafter allowing said liquid coating material to become set while under the influence of said electrostatic force. No. 408,800. The Brush Development Company. (Charles K. Gravley).

Luminous substance comprising a heat treated combination of one or more of the materials belonging to the group of compounds consisting of the borates and phosphates of the alkali metals, the metals of the second group of the periodic system excepting mercury, the metals of the third group of the periodic system activated by 0.05 to 30 mol per cent of one or more activating materials belonging to the group of compounds consisting of the borates and phosphates of silver, thallium, tin and lead. No. 408,801. Canadian General Electric Company Limited. (Magdalene Hüniger and Hans Panke).

Method of preparing luminescent cadmium tungstate. No. 408,804. Canadian General Electric Company Limited. (James N. Bowtell, Henry G. Jenkins and Alfred H. McKeag).

Etching solution containing about 95 parts of a 20% by weight cupric sulfate $CuSO_4.5H_2O$ solution, 5 parts of a 35% by weight niter cake solution, and a trace of material for reducing surface tension. No. 408,813. Canadian Kodak Company, Ltd. (Alexander Murray).

Process comprising reacting an aliphatic hydroxy compound having at least six carbon atoms and selected from the group consisting of aliphatic monohydric and polyhydric alcohols and polyhydric alcohol partial ethers and partial esters, with a mixture of sulfur dioxide and a halogen. No. 408,833. Colgate-Palmolive-Peet Company. (John Ross and Dwight J. Potter).

Purifying organic sulfonates by removing therefrom water-soluble salts of inorganic acids. No. 408,834. Colgate-Palmolive-Peet Company. (Gilbert DeW. Miles, Kenneth L. Russell and Adam C. Bell).

Non-efflorescing bar soap comprising a major proportion of a soap base, sodium carbonate in amount sufficient to cause objectionable efflorescence in the absence of alkali phosphate, and a water-soluble alkali phosphate in amount ranging up to about 9% of the total composition and sufficient substantially to prevent such efflorescence. No. 408,835. Colgate-Palmolive-Peet Company. (Robert F. Heald).

Tendered meat steak having a plurality of parallel slits formed in each side thereof, each slit extending more than half way through the steak, and all the slits on either side extending in the same direction, the direction of the slits on one side being at an angle to the direction of those on the other side. No. 408,837. Cube Steak Machine Company, Inc. (Joseph P. Spang).

Refrigerating plant for an air conditioning installation. No. 408,838. Arthur D. Cummings Ltd. (Ford J. Cummings).

Refrigerator apparatus for a cold storage plant. No. 408,839. Arthur D. Cumming Ltd. (Ford J. Cumming).

Hectograph blanket having a copy mass of a cellulose derivative gel whose liquid portion consists of a solvent for a water and alcohol soluble dye, said gel having the characteristic of being non-tacky and more repellent to paper than ordinary gelatine hectograph gels. No. 408,841. Ditto, Incorporated. (William J. Champion).

Hectograph blanket comprising a backing having thereon a copy mass of a hydrophilic gel containing oil dispersed in the copy mass as an oil in water type emulsion. No. 408,840. Ditto, Incorporated. (William Hoskins, Jr.).

Moistening mechanism for applying a film of liquid to the face of a copy sheet in its movement to the impression drum of a liquid process duplicating machine. No. 408,842. Ditto, Incorporated. (Eli Wilderson).

Yeast treating method comprising maintaining yeast in contact with a nutrient for a sufficient period of time and at a suitable temperature to cause the yeast cells to swell and form gas within themselves, subjecting such material in an aqueous solution to high pressure, then suddenly releasing the pressure and thereby causing the yeast cells to explode, and then separating the released carbon dioxide from the remaining liquid mass. No. 408,850. Emulsions Process Corporation. (William P. Torrington).

Method of puffing cereals other than maize which comprises subjecting them in the presence of at least one integument-weakening agent to substantial superatmospheric temperature and to substantial superatmospheric external pressure by means of steam and then suddenly very greatly reducing such external pressure. No. 408,853. Food Manufacturing Corporation. (William J. Plews).

Resilient tire for a free-rolling guiding wheel of a tractor or farm implement type vehicle. No. 408,857. The B. F. Goodrich Company. (William H. Elliott).

Resilient tire for a free-rolling guiding wheel of a tractor or farm implement type vehicle adapted for use on soft soil. No. 408,858. The B. F. Goodrich Company. (Harold W. Delzell and Chase F. Ofensend).

Treatment of chrome tanned leather for the production of glue or gelatine by subjecting the leather to the action of an alkali and a borate in aqueous solution. No. 408,859. Gypsum, Lime and Alabastine, Canada, Limited. (Albert Hoeren).

Smokeless powder processing apparatus which includes a tank having an opening at the top and bottom, and including in the bottom means positioned to aid in removing the smokeless powder, and in the top means positioned to aid evenly distributing the smokeless powder and centrally located means positioned to aid in forming the smokeless powder in a layer of approximately the same thickness throughout the tank. No. 408,860. Hercules Powder Company. (Bernhard Troxler).

Manufacture of artificial fibers from ground nut protein by extrusion into a coagulating bath. No. 408,866. Imperial Chemical Industries Limited. (David T. Ardrossan, Robert V. Seddon and William Sever).

Processing silk by subjecting it to a treatment in an aqueous bath consisting essentially of an oil emulsion and sufficient acidic material to adjust the pH of said bath to 3.0 to 5.8. No. 408,867. The Institute of Paper Chemistry. (Ben W. Rowland and Douglass Fronmuller).

Processing silk by subjecting it to a preliminary treatment in an aqueous acid rinsing bath consisting essentially of an acidic material and a buffer, the buffer being present in sufficient amount to adjust and maintain the pH value of the bath to 3.5 to 5.5. No. 408,868. The Institute of Paper Chemistry. (Ben W. Rowland and Douglass Fronmuller).

Manufacture of a seed disinfectant by treating a compound of the type $R(HgX)_n$ in which R is an aryl radical, X is an acid radical and n is a small whole number, in the presence of water with an alkaline oxide producing in the water solution a hydrogen ion concentration about that of magnesium oxide, whereby a reaction takes place with the formation of the corresponding mercury hydroxide. No. 408,871. Leyton Manufacturing Company, Ltd. (George Six and Joseph R. Booer).

Process for preparing a nutrient material suitable for oral, rectal, and intravenous administration, containing all of the amino acids resulting from the hydrolysis of highly purified protein with acidified water until free from mineral salts. No. 408,872. Mead Johnson & Company. (Kenneth S. Kemmerer).

Process of preparing from highly purified protein material a nutrient product suitable for oral, rectal, and intravenous administration and characterized by the preservation therein of all the amino acids naturally occurring in the chosen proteid material. No. 408,873. Mead Johnson & Company. (Kenneth S. Kemmerer).

Flexible abrasive article of the coated abrasive type. No. 408,875. Minnesota Mining & Manufacturing Company. (Byron J. Oakes).

Process for treating distillery slop. No. 408,877. National Distillers Products Corporation. (Ellis C. Pattee).

Drying starch by spreading substantially uniformly dimensioned units of wet filtered starch mass in a substantially tranquil state on a flat foraminous support containing a minimum amount of heat transfer surface per square unit of its area with the openings thereof of lesser size than the smallest dimension of the starch units, and subjecting the starch units to temperatures ranging from 150-300°F. No. 408,882. Proctor & Schwartz, Incorporated. (Alpheus O. Hurxthal and Louis P. Tiers).

Process of drying cornstarch and other similar substances in finely divided state. No. 408,883. Proctor & Schwartz, Incorporated. (Louis P. Tiers).

Making fuel composition predominantly of normally fluid readily flammable hydrocarbons. No. 408,888. Safety-Fuel Incorporated. (Eugene D. Stirlen).

Metal article having a surface provided with a single baked-on polarity-stratified coating. No. 408,889. Stoner-Mudge, Inc. (Frank R. Stoner, Jr. and Daniel McC. Gray).

Apparatus for continuously evaporating solids under high vacuum. No. 408,919. General Mills, Inc. (American Research Products, Inc.) (Charles G. Ferrari and Lester F. Borchardt).

KLEAN-KOTE
400,698

Wales

400,716

HAYS
VISIO RATIO
GAGE
400,781

AUTOPOSITIVE
400,803

D-19
445,386

D-52
445,387

D-76
445,388

DK-20
445,389

5897
447,153

LINGUETS
450,289

SAPAMINE
450,290

NYRAY
451,671

PLASTAMINE
454,019

LANITOL
454,049

454,237

ALBI
454,567

PLIABA
454,586

PLASTALLOY.
455,129

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SIL-X
455,790

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Parfax
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457,420

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457,509

ISO-PARINOL
457,526

Xtra-Chlor
457,850

TINON
457,875

ALCOMEAL
457,976

Colonial
458,009

MONIO
458,082

MAROCOL
458,147

'HYPOLOID'
458,170

DURAPEL
458,292

Niphanoid
458,350

Trade Mark Descriptions†

400,698. Klean-Kote Co., Pittsburgh, Kans.; Dec. 30, 1941; for chemical solution for dustproofing; since Oct. 1, 1939.
400,716. Wales Chemical Co., Brooklyn, N. Y.; Jan. 14, 1943; for epsom salt, and other chemical preparations; since June 11, 1940.
400,781. The Hays Corp., Michigan City, Ind.; Apr. 21, 1941; serial No. 442,788; for instruments or gages; since Dec. 15, 1940.
400,803. Eastman Kodak Co., Jersey City, N. J., and Rochester, N. Y.; May 1, 1942; serial No. 452,708; for photographic film and photographic paper; since Nov. 1, 1938.
445,386-445,389. Eastman Kodak Co., Jersey City, N. J., and Rochester, N. Y.; July 16, 1941; for photographic developers; since Nov. 2, 1939; May 5, 1932; June 12, 1943; Dec. 11, 1938 respectively.
447,153. Pfister Hybrid Corn Co., El Paso, Ill.; Sept. 18, 1941; for seed corn; since May 10, 1938.
450,289. Society of Chemical Industry in Basle, Basel, Switzerland; Jan. 17, 1942; for preparations containing active hormonal compounds; since June 16, 1941.
450,290. Society of Chemical Industry in Basle, Basel, Switzerland; Jan. 17, 1942; for intestinal antiseptic and an internal disinfectant; since April, 1934.
451,671. Colgate-Palmolive-Peet Co., Jersey City, N. J.; Mar. 17, 1942; for soap; since Feb. 10, 1942.
454,019. Sharples Chemicals, Inc., Philadelphia, Pa.; July 2, 1942; for synthetic organic chemical condensation products; since June 3, 1942.
454,049. Arkansas Co., Inc., Newark, N. J.; July 4, 1942; for compound having detergent, penetrating and emulsifying properties; since Jan., 1938.
454,237. Pittsburgh Plate Glass Co., Pittsburgh, Pa.; July 15, 1942; for caustic soda; since Feb. 1, 1941.
454,567. Albi Chemical Corp., New York, N. Y.; July 29, 1942; for chemical preparations; since July 15, 1942.
454,586. United Chemical Co., Inc., Kansas City, Mo.; July 29, 1942; for glycerine substitute; since December, 1918.
455,129. Plastalloy Co., Burbank, Calif.; Aug. 26, 1942; for thermoplastic synthetic resins; since April 1, 1941.
455,174-455,175. Commercial Solvents Corp., New York, N. Y.; Aug. 29, 1942; for chemical compositions; since June 15, 1942 and June 29, 1942 respectively.
455,335. The Firestone Tire & Rubber Co., Akron, O.; Sept. 4, 1942; for synthetic organic resins, and powders; since Dec. 2, 1941.
455,787-455,790. Chromium Mining & Smelting Corp., Ltd., Sault Ste. Marie, Canada; Sept. 26, 1942; for exothermic metallurgical nickel; since Oct. 16, 1939; Jan. 5, 1940; March 16, 1940 respectively.
455,838. Aralac, Inc., New York, N. Y.; Sept. 29, 1942; for fibrous materials; since Aug. 6, 1942.
456,724. Puritan Chemical Co., Atlanta, Ga.; Nov. 9, 1942; for treating fabrics; since Oct. 22, 1942.
456,889. George F. Hutter, doing business as George F. Hutter Co., Buffalo, N. Y.; Nov. 18, 1942; for petroleum solvent; since Nov. 1, 1934.
457,011. Rohm & Haas Co., Philadelphia, Pa.; Nov. 24, 1942; for synthetic resinous materials; since Nov. 13, 1942.
457,079. Kwikote Products, Chicago, Ill.; Nov. 27, 1943; for fuel oil conditioner; since July, 1943.
457,144. Reichhold Chemicals, Inc., Detroit, Mich.; Nov. 30, 1942; for synthetic rubber; since Nov. 20, 1942.
457,388. Economics Laboratory, Inc., St. Paul, Minn.; Dec. 14, 1942; for cleansing compound; since Dec. 1, 1923.
457,420. The Pacific Lumber Co., San Francisco, Calif.; Dec. 15, 1942; for shredded bark fiber; since Dec. 4, 1942.
457,509. Precision Scientific Co., Chicago, Ill.; Dec. 18, 1942; for laboratory equipment; since January, 1935.
457,526. Medical Chemicals, Inc., Baltimore, Md.; Dec. 19, 1942; for germicidal and fungicidal preparations; since Mar. 15, 1942.
457,850. The J. B. Ford Co., Wyandotte, Mich.; Jan. 11, 1943; for germicide and deodorant; since July, 1942.
457,875. Geigy Co., Inc., New York, N. Y.; Jan. 12, 1943; for dyes for textile purposes; since Mar. 9, 1933.
457,976. International Milling Co., Minneapolis, Minn.; Jan. 18, 1943; for wheat meal for manufacture of alcohol; since Dec. 2, 1942.
458,009. Colonial Beacon Oil Co., Boston, Mass.; Jan. 19, 1943; for refined oils; since Jan. 1, 1904.
458,082. Seeman Brothers, Inc., New York, N. Y.; Jan. 21, 1943; for ammonia substitute; since Dec. 28, 1942.
458,147. W. H. & L. D. Betz, Frankford, Philadelphia, Pa.; Jan. 25, 1943; for chemical compound for conditioning boiler water; since Jan. 3, 1943.
458,170. Burroughs Wellcome & Co. (U.S.A.), Inc., New York, N. Y.; Jan. 26, 1943; for acetylcholine bromide, and other chemical preparations; since January, 1917.
458,292. L. Sonneborn Sons, Inc., New York, N. Y.; Feb. 1, 1943; for water repellent composition for treating textiles; since Sept. 18, 1943.
458,350. Winthrop Chemical Co., Inc., New York, N. Y.; Feb. 4, 1943; for anesthetic preparations; since June 9, 1938.

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